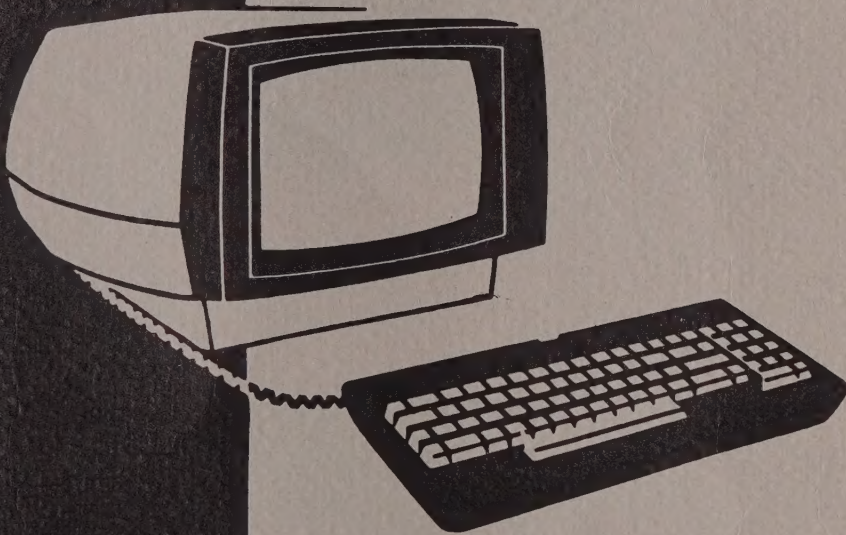


PUT IN LOCAL (1/2 Dup)
TURN PWA ON
you should be able to
Type characters on
screen.

SBCS

X2197



ADDS
Applied Digital Data Systems Inc.

VIEWPOINT

MAINTENANCE MANUAL

518-30200

VIEWPOINT MAINTENANCE MANUAL
Rev. A December, 1981

PREFACE:

This manual is intended for maintenance personnel with digital electronics experience. It contains a System Overview, Theory of Operation and Troubleshooting sections. It is not intended as a tutorial. Familiarity with standard analog and digital troubleshooting techniques is required.

For additional information the following manuals can be obtained from ADDS.

Viewpoint Users Manual	Part No. 518-30000 (129-24900 PC Board)
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Viewpoint Users Manual	Part No. 518-30600 (129-29500 PC Board)
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VERSATILE ERASE FUNCTION -

- End of line
- End of screen
- Entire screen

VISUAL ATTRIBUTES -

Tagged data may be displayed with the following attributes:

- Normal
- Underline
- Reverse Video
- Blinking
- Half-Intensity
- Suppressed Video

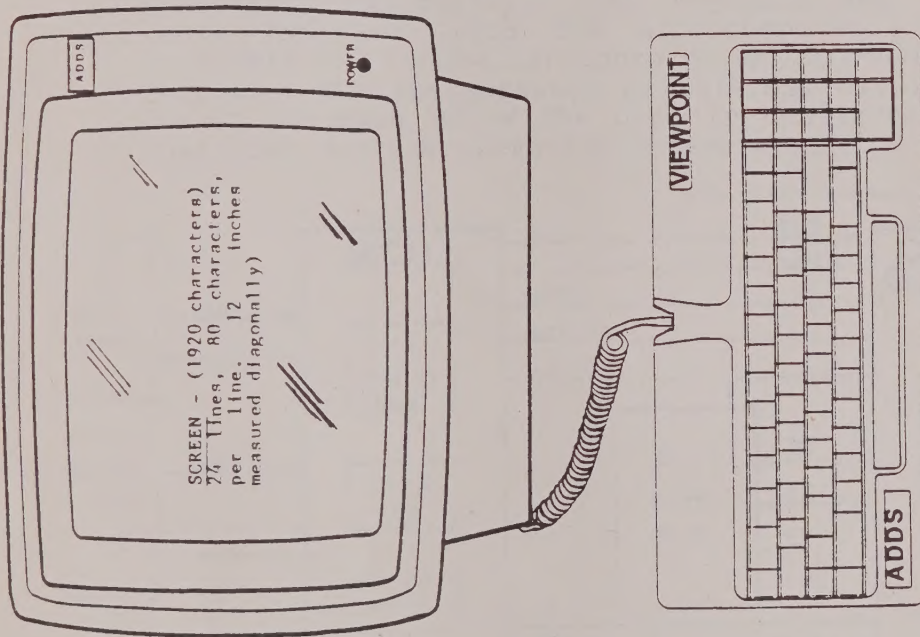
or various configurations of the above.

CHARACTER SET - 96 displayable ASCII plus 3 switch-selectable foreign characters formed on a 5 x 8 dot matrix.

PRINT TRANSPARENT MODE - Data and control codes are passed directly to the AUX port without being displayed or acted upon.

MONITOR MODE - All received data, including control codes are displayed without being acted upon.

KEYBOARD - 58 alphanumeric, symbol and control keys arranged in a standard typewriter style array.



OPERATING REQUIREMENTS

Power 120 volts @ 60 Hz, 60 Watts 0.50 Amp.
240 volts @ 50 Hz, 60 Watts 0.25 Amp.
220 volts @ 50 Hz, 60 Watts 0.25 Amp.

Temperature Operation: 10 degrees to 40 degrees C.
Storage: 0 degrees to 85 degrees C.

Humidity 10% to 95% RH, non-condensing.

CURSOR CONTROL - Absolute addressing. Separate vertical and horizontal addressing.

SELECTABLE CURSOR STYLE - Blinking or steady; block or underline.

DISPLAY DIMENSIONS -
Height - 12 3/8"
Width - 14"
Depth - 14 1/2"
Weight - 20 lbs.

DATA COMMUNICATIONS - Full or half-duplex. 8 selectable baud rates unidirectional, gated, serial output AUX port, switch-selectable parity.
EIA RS232C/CCITT V.24

COMMUNICATIONS INTERFACE - 8 switch-selectable baud rates from 110 to 19,200.

ADJUSTABLE VIEWING ANGLE - Press-to-release tab at rear of cabinet allows viewing angle to be adjusted.

NUMERIC PAD - Adding machine style with 3 function keys and 5 embedded cursor control keys. Individual direction keys: $\rightarrow$, $\uparrow$, $\downarrow$, $\leftarrow$.

KEYBOARD DIMENSIONS -
Height - 2 5/8"
Width - 15"
Depth - 7"
Weight - 2 lbs.

VIEWPOINT SPECIFICATIONS

The ADDS Viewpoint is a compact display terminal with a removable keyboard. The viewing angle may be adjusted to one of two vertical positions by carefully depressing the 'Press to Release' tab on the back of the cabinet. The main cabinet contains the CRT, system logic, video circuits and power supply.

1.1 Components

The terminal's concise architecture, diagrammed in Figure 1-1, uses state of the art multi-function devices. Viewpoint is controlled by a microcomputer with program memory and communications controller as well as processing capability. The keyboard and two serial ports interface with the microcomputer. The programmable CRT controller contains an internal character generator ROM and accesses an external display memory. Option switches allow the user to configure the terminal with desired operating parameters.

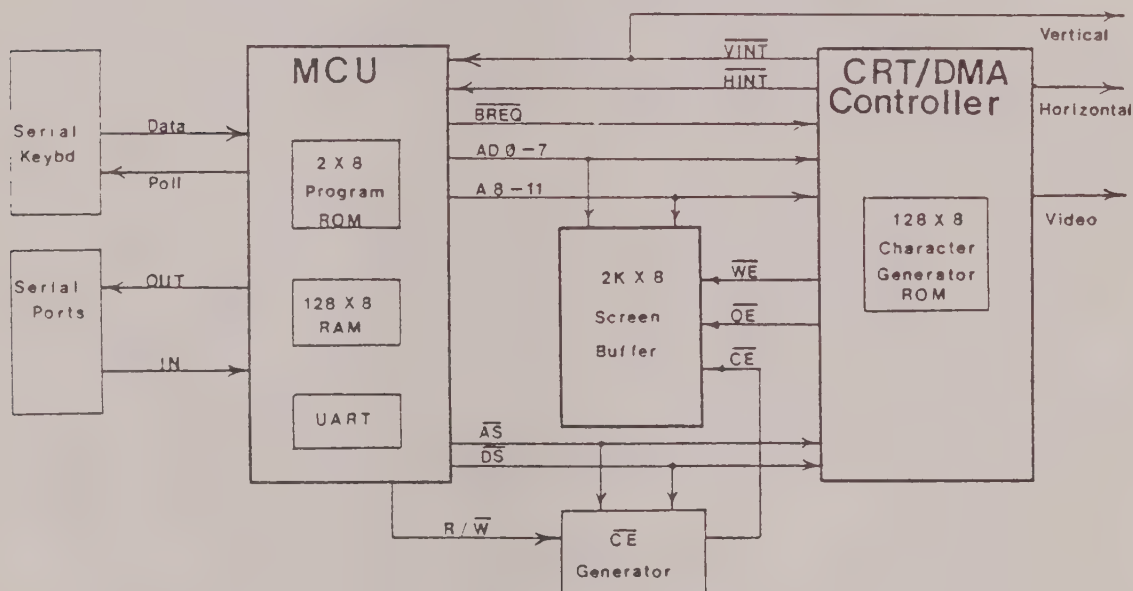


Figure 1-1 Viewpoint Architecture
(For 129-249)

The CRT has a 12 inch diagonal screen. The display consists of 24 lines of 80 characters each for a total of 1920 character positions. Data can be displayed as dark characters on a light background or as light characters on a dark background. Upper and lower case are displayed in a 5 x 8 dot pattern on a 7 x 10 dot matrix which allows for descended lower case.

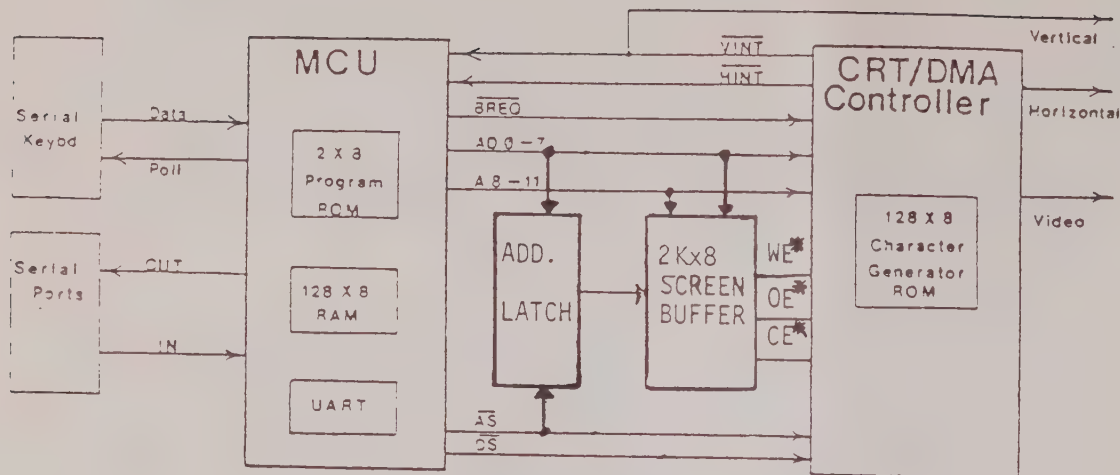


Figure 1-1a Viewpoint Architecture
(For 129-289 and 129-295)

The removable keyboard, shown in Figure 1-2, is arranged in a standard typewriter style array with a separate numeric pad, cursor control and function keys.

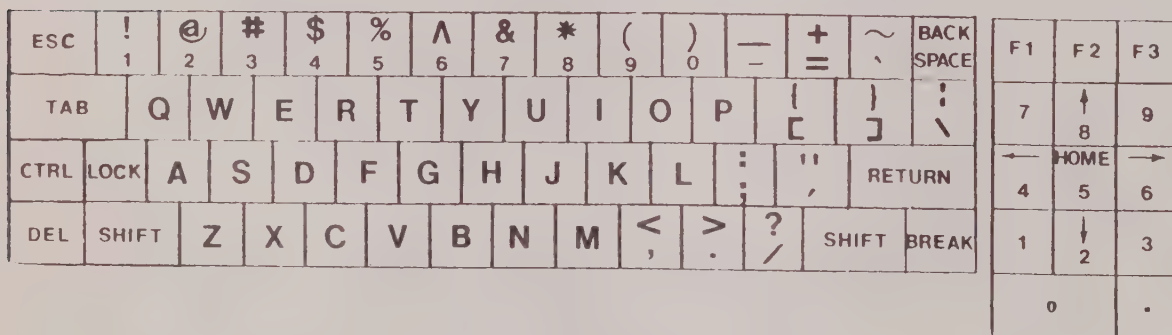


Figure 1-2 Viewpoint Keyboard

1.2 Operation

At power ON, the terminal is configured by the switch set parameters. These include full or half-duplex, transmission baud rate, display characteristics, etc. See Section 1.3.

The terminal functions in Conversation mode with data transmitted and received on a character by character basis. Transmission is standard teletype emulation with normal rules for full and half-duplex with the exception that reverse channel is not supported.

The cursor is displayed by switch selection as a block or an underline, blinking or steady, in the inverse of the text display. When the cursor is positioned on an existing line of data, new data overwrites old data showing on the screen. Old data remains on the screen until overwritten or erased.

Data can be tagged by setting the eighth bit to a "1". Tagged data will be displayed with a visual attribute, if an attribute is set.

Five major attributes (Reverse video, Half intensity, Blinking, Underline and Zero intensity) are included and can be used in any of the 13 modes listed in Figure 1-3.

The attributes selected affect every tagged character on the screen. Any change of the selected attributes will affect every tagged character.

Attribute	ASCII Code	Hex Code
Normal*	d	40
Half Intensity	A	41
Blinking	B	42
Half Intensity, Blinking	C	43
Reverse Video	P	50
Rev. Video, Half Intensity	Q	51
Rev. Video, Blinking	R	52
Rev. Video, Half Intensity Blinking	S	53
Underlined	\	60
Underlined, Half Intensity	a	61
Underlined, Blinking	b	62
Underlined, Half Intensity Blinking	c	63
Video Suppress	D	44

*Normal (black or white characters) is switch selectable

Figure 1-3 Visual Attributes

1.3 Switch Settings

The switches are considered "1" when down, "0" when up, and are set by pressing the lever to the desired position.

Switch settings are shown in Figure 1-4.

Switch No.	Name	Setting	Function
S1-1, 2, 3	BAUD RATE	000	110
		001	150
		010	300
		011	1200
		100	2400
		101	4800
		*110	9600
		111	19,200
S1-4	AUTO SCROLL	*0	Disabled
		1	Enabled
S1-5	AUTO LINE FEED	*0	Disabled
		1	Enabled
S1-6	LINE MODE	*0	Half Duplex
		1	Full Duplex
S1-7, 8	PARITY	*00	Odd
		01	Even
		10	Marking
		11	Spacing
S2-1	CHARACTER DISPLAY	*0	Light Characters on dark background
		1	Dark Characters on light background
S2-2	PARITY CHECK	*0	Disabled
		1	Enabled
S2-3	SCREEN REFRESH RATE	*0	60 HZ
		1	50 HZ
S2-4, 5, 6	INTER-NATIONAL CHARACTER SETS	*000	Domestic (U.S.)
		001	Belgium/France/Azerty
		010	Germany/Switzerland
		011	Sweden/Finland
		100	Denmark/Norway
		101	Spain
		110	UK/Netherlands
		111	(Reserved)
S2-7	CURSOR DISPLAY	*0	Steady
		1	Blinking
S2-8	CURSOR FORMAT	*0	Rectangular block
		1	Underline

An audible key click is enabled via jumper JP-1. See Figure 1-4.

* Indicates factory set switches.

Figure 1-4 129-24900 and 129-28900
PC Board Switch Settings

Switch No.	Name	Setting	Function
S1-1,2,3	BAUD RATE	000	110
		001	300
		010	1200
		011	1800
		100	2400
		101	4800
		*110	9600
		111	19,200
S1-4	AUTO	0	Disabled
	SCROLL	*1	Enabled
S1-5	AUTO	*0	Disabled
	LINE FEED	1	Enabled
S1-6	LINE	*0	Half Duplex
	MODE	1	Full Duplex
S1-7,8	PARITY	*00	Odd
		01	Even
		10	Marking
		11	Spacing
S2-1	CHARACTER DISPLAY	*0	Light Characters on dark background
		1	Dark Characters on light background
S2-2	DISPLAY	*0	Disabled
	PARITY ERROR	1	Enabled
S2-3	SCREEN	0	60 HZ Domestic
	REFRESH RATE	1	50 HZ International
S2-4	RESERVED		
S2-5,6	INTER-NATIONAL CHARACTER SETS	*00	Domestic (U.S.)
		01	Belgium/France/Azerty
		10	Gemany/Switzerland
		11	UK/Netherlands
S2-7	CURSOR	*0	Steady
	DISPLAY	1	Blinking
S2-8	CURSOR	*0	Rectangular block
	FORMAT	1	Underline
* Indicates factory set switches.			

Figure 1-4a 129-295 PC Board Switch Settings

<u>Command</u>	<u>ASCII Code</u>	<u>Generation From Keyboard</u>
Address, Absolute	ESC,Y,r,c*	ESC,Y,r,c,*
Audible Tone	BEL	CTRL-G
Backspace	BS	BACKSPACE or CTRL-H
Cursor Back	NAK	CTRL-U or ←
Cursor Down	LF	CTRL-J or ↓
Cursor Forward	ACK	CTRL-F or →
Cursor Home	SOH	CTRL-A or Home
Cursor Up	SUB	CTRL-Z or ↑
Erase to End of Line	ESC,K	ESC,K
Erase to End of Page	ESC,k	ESC,k
Erase Screen	FF	CTRL-L
Keyboard Lock	ESC,5	ESC,5
Keyboard Unlock	ESC,6	ESC,6
Monitor Mode Enable	--	CTRL-1**
Monitor Mode Disable	--	CTRL-2**
New Line	CR	CTRL-M or RETURN
Set Attribute	ESC,Ø,x***	ESC,Ø,x***
Tag Bit Set	SO	CTRL-N
Tag Bit Reset	SI	CTRL-O
Transparent Print ON	ESC,3	ESC,3
Transparent Print OFF	ESC,4	ESC,4

* - r,c = row and column code. See Appendix A.
 ** - entered on the main typewriter array only.
 *** - x = attribute, See Figure 1-3.

Figure 1-5 129-249 and 129-28900
PC Board Command Code Chart

1.4 Command Codes

The command codes implemented by Viewpoint are listed in Figure 1-5.

Normally these control codes (column 0 and 1 of the ASCII chart) are not displayed. The command CTRL-1 places the terminal in Monitor mode where all characters received, including control codes, are displayed. Figure 1-6 shows the symbols used for each code. While in Monitor mode, the terminal will only display the data stream and will not act on any of the control commands. The command CTRL-2 terminates Monitor mode and returns the terminal to normal operation. Monitor mode cannot be enabled from the CPU.

<u>Command</u>	<u>ASCII Code</u>	<u>Generation From Keyboard</u>
Address, Absolute	ESC,Y,r,c*	ESC,Y,r,c,*
Address, Vertical	VT,a****	CTRL-K,a****
Address, Horizontal	DLE,b****	CTRL-P,b****
Audible Tone	BEL	CTRL-G
Aux Port Enable	DC2	CTRL-R
Aux Port Disable	DC4	CTRL-T
Backspace	BS	BACKSPACE or CTRL-H
Cursor Back	NAK	CTRL-U or ←
Cursor Down	LF	CTRL-J or ↓
Cursor Forward	ACK	CTRL-F or →
Cursor Home	SOH	CTRL-A or Home
Cursor Up	SUB	CTRL-Z or ↑
Cursor Enable	CAN	CTRL-X
Cursor Disable	ETB	CTRL-W
Erase to End of Line	ESC,K	ESC,K
Erase to End of Page	ESC,k	ESC,k
Erase Screen	FF	CTRL-L
Keyboard Lock	ESC,5 or EOT	ESC,5 or CTRL-D
Keyboard Unlock	ESC,6 or STX	ESC,6 or CTRL-B or CTRL-BREAK
Monitor Mode Enable	---	CTRL-1**
Monitor Mode Disable	---	CTRL-2**
New Line	CR	CTRL-M or RETURN
Set Attribute	ESC,Ø,x***	ESC,Ø,x***
Tag Bit Reset	SI	CTRL-O
Tag Bit Set	SO	CTRL-N
Transparent Print ON	ESC,3	ESC,3
Transparent Print OFF	ESC,4	ESC,4

* - r,c = row and column code. See Screen Addressing Chart, Appendix A.
 ** - Entered on the main typewriter array only, not the numeric pad.
 *** - Attribute, See Figure 2-1.
 **** - a = (See Appendix E.) Vertical Address.
 b = Horizontal Address

Figure 1-5a 129-295 PC Board Command Code Chart

Control Code	Symbol	Control Code	Symbol	Control Code	Symbol
NUL	<u>@</u>	VT	<u>K</u>	SYN	<u>V</u>
SOH	<u>A</u>	FF	<u>L</u>	ETB	<u>W</u>
STX	<u>B</u>	CR	<u>M</u>	CAN	<u>X</u>
ETX	<u>C</u>	SO	<u>N</u>	EM	<u>Y</u>
EOT	<u>D</u>	SI	<u>O</u>	SUB	<u>Z</u>
ENQ	<u>E</u>	DLE	<u>P</u>	ESC	<u>I</u>
ACK	<u>F</u>	DC1	<u>Q</u>	FS	<u>\</u>
BEL	<u>G</u>	DC2	<u>R</u>	GS	<u>]</u>
BS	<u>H</u>	DC3	<u>S</u>	RS	<u>^</u>
HT	<u>I</u>	DC4	<u>T</u>	US	<u>_</u>
LF	<u>J</u>	NAK	<u>U</u>		

Figure 1-6 Displayed Control Code Symbols

- NOTES:
1. CTRL-1 and CTRL-2 must be entered on the main typing array, not the numeric pad.
 2. Displayed control codes are alpha characters tagged with the underline attribute. All tagged data will be displayed with an underline when the Monitor mode is entered. After the Monitor mode is disabled, a new attribute may be entered.

SECTION 2: THEORY OF OPERATION - LOGIC BOARD

2.1 General

The Viewpoint logic board consists of three main chips: a microcomputer unit (MCU), a cathode ray tube/direct memory access controller (CRT/DMAC) and a random access memory (RAM). Additional circuitry handles internal and I/O communications and video signals.

The logic board functions are centered around the microcomputer unit (MCU). Figure 2-1 below defines MCU pin numbers by signal names and functions. The MCU contains the following functional blocks:

Central Processing Unit (CPU)
Program ROM
Program RAM (scratch pad)
Baud Rate Generator
Universal Asynchronous Receiver Transmitter (UART)
Clock (2 timers and internal crystal oscillator)

Pin No.	Signal	Function
17-20	KB4-KB7	Input keyboard code
31-34	KB0-KB3	
30	KBINT*	Keyboard interrupt
40	POLL	Keyboard POLL and strobe in switch data
16	LOPT*	To load shift register
38	SOPTIN	Switch data
6	RESET*	Reset MCU
37	RTS*	Request to Send (Comm)
4	TxD	Transmit data
29	BREAK*	Break to Comm
5	RxD	Receive data
35	CTS*	Clear to send (Comm)
9	AS*	Address strobe
12	HINT*	Horizontal interrupt input
39	VINT*	Vertical interrupt input
8	DS*	Data strobe
2-3	XTAL1,2	7.372 crystal divided in half and used by MCU for UART baud rate, timer for keyboard and POLL routine.
36	BREQ*	Bus request to CRT/DMAC
10 (129-24900)	RFRSH*	Refresh to RAM
10 (129-29500)	AUXON	Used to control the flow of data to the Aux port
10 (129-28900)	Not Used	
13-15	AD0-10	Address/Data bus
21-28		

Figure 2-1 MCU Signal Functions

The CRT/DMAC also has a number of functional blocks that make it a powerful device. Figure 2-2 is a list of signal names and functions with the corresponding IC pin numbers of the CRT/DMAC. These blocks are the following:

Direct Memory Access Controller
Horizontal and Vertical Timing Circuits
Character Generator
Cursor Display Circuitry
Visual Attribute Circuitry

The Random Access Memory (RAM) is used for screen memory and is contained in a single 24 pin package that is arranged in a 2K x 8 format.

Both the MCU and the CRT/DMAC have internal oscillators so they require only external crystals. Normally, the CRT/DMAC has control of the "buses" and is accessing the display RAM for screen refresh with the MCU interrupting to write new data to memory.

<u>Pin No.</u>	<u>Signal</u>	<u>Function</u>
2-6	A/D 6-10	Multiplexed Address/Data Lines
23-28	A/D 0-5	
9,10	X0, X1	Crystal Oscillator inputs
7	Video	Video Signal to Monitor
8	1/2 INT	Half Intensity Signal to Monitor
11	BREQ*	Bus Request from MCU
14	HINT*	Bus Grant to MCU during 9th Character Line
15	VDRIVE	Vertical Drive to Monitor
	VINT*	also Vertical Interrupt to MCU
16	HDRIVE	Horizontal Drive to Monitor
18	OE*	Output Enable - used for CRT/DMAC Read from RAM
19	WE*	Write Enable to RAM
20	AS*	Bidirectional Address Strobe
22	DS*	Bidirectional Data Strobe

Figure 2-2 CRT/DMAC Signal Functions

The Viewpoint terminal has several different logic board revisions. Because of the different logic boards we will explain each board separately to avoid confusion.

2.2 Circuit Description - 129-249

Initialization

At power-on, capacitor C7 charges by a resistor that is internal to the MCU. Diode CR1 discharges capacitor C7 in case of an interruption of power, and resets the MCU.

Two eight-position DIP, switches S1 on the rear panel and S2 on the logic board, are loaded into the MCU on power-up. Resistor pack RN1 (10k) holds the switch inputs high unless a switch is turned on.

The load strobe signal (LOPT*) loads the switch settings into the parallel to serial shift registers UE1 and UE2 (74C165). This takes place only on power-up. After the data is loaded into UE1 and UE2 the poll signal pulses and loads the data into the MCU on the SOPTIN pin. (The poll signal is also used for the keyboard and can be used for loading the switches because the keyboard is not yet active.)

Keyboard Interface

The serial ASCII encoded keyboard is connected to the terminal by a four wire cable carrying signal ground, chassis ground, +12 volts, and an input/output line. The keyboard is polled by the MCU telling the keyboard that it can send data. If a key has been pressed, the serial data is returned on the same line. The returning keyboard data is buffered and cleaned up by UB1 (74LS14) and sent to UD-4 and UC-4. UD-4 (74LS123, one shot) is used to clock data into UC-4 (74LS164, serial to parallel conv) causing the keyboard data to appear on the KB0/KB7 lines allowing it to be loaded into the MCU.

The alarm command (Control-G) will cause two poll pulses in immediate succession to activate the alarm on the keyboard.

Inter Element Communications

When the MCU wants control of the bus, it sends a bus request asking permission to send data on the bus to the CRT/DMAC or the display buffer. This request is by means of the BREQ line. The CRT/DMAC answers with a bus grant (HINT) which allows the MCU to send the data. The MCU can only send (write) data. When the MCU is "on the bus" it sends read/write timing signals (pin 7) to Q3 which buffers them for UC3 (74ALS74). This read/write signal, along with address strobe (AS*) and data strobe (DS*) make up chip select, (CS*) which is used to enable the memory (UA3).

The display memory is written to by the MCU and read by the CRT/DMAC unless the terminal is executing an erase function. Then the CRT/DMAC writes "blanks" to the display memory. WE* (write enable) from the CRT/DMAC enables the memory so that data can be written into it. OE* (output enable) allows the memory to force data onto the bus. Address can be read on the bus on the trailing edge of AS*, and data can be read on the trailing edge of DS*. The display memory is automatically refreshed by the CRT/DMAC, and is controlled by the RFRSH* line.

The CRT/DMAC has programmable registers that are addressed by the MCU as memory mapped space. At power-up, the cursor address and character display (attribute latch) registers are set. During operation the address registers and attribute latch are updated and the erase register is programmed if an erase function is received. All attributes are implemented internally except for half intensity which sets the 1/2 INT pin high, producing a signal that cuts the video output in half. All attributes are implemented on a per character basis determined by the state of the tag bit.

The CRT/DMAC normally has control of the system bus, accessing each character of the display memory on each scan line to refresh the screen. When the MCU requires the bus, it issues a bus request (BREQ*). At the end of scan line eight of the current character row, the CRT/DMAC issues a horizontal interrupt (HINT*) strobe and tri-states its address and data lines for the equivalent of two scan lines (64 usec) after which the CRT/DMAC resumes control. If BREQ* comes during an erase, the erase is completed before the buses are released.

The CRT/DMAC uses AS* and DS* to generate write enable (WE*) and output enable (OE*) allowing writing to and reading from the display RAM.

When the terminal receives an erase or scroll function, the CRT/DMAC erase register is programmed for end of line or end of page with the current cursor address used for the erase start. Erase screen uses the top of screen address. The CRT/DMAC fills RAM spaces with "blanks" and erase is accomplished during screen refresh. When the screen scrolls, the top line is erased, the top of screen address is incremented and the erased line becomes the new 24th display line.

The video and half intensity signals from the CRT/DMAC are combined, buffered and sent to the CRT monitor. Variable resistor R20 controls the contrast; a variable resistor in the monitor circuit controls brightness.

Horizontal and vertical drive signals (VDRIVE and HDRIVE) are schmitt-triggered on UBI to drive the monitor. The screen is covered in 240 scan lines, at 60 Hz retrace is timed at 20 scanned lines, at 50 Hz retrace is 72 lines.

The Viewpoint communication support circuitry is fairly simple. The MCU has an internal UART that supports transmit data, receive data, clear to send (CTS) and request to send (RTS). The MCU only requires circuitry to make these signals compatible with EIA voltage levels (UC1, UC2). Diodes CR2, CR3, CR4 and CR5 are to prevent damage by clamping input signal voltages.

Figure 2-3 is a list of data communication signals supported in the Viewpoint.

Aux Port Connector			
Pin		Signal	Description
1		Protective GND	
7		Signal GND	
3		AUX out	Transmitted Data
EIA Port Connector			
Pin No.	RS232C Circuit	Signal	Description
1	AA	GND	Protective Ground
2	BA	EIAOUT	Transmitted Data
3	BB	EIAIN	Received Data
4	CA	RQSND	Request to Send
5	CB	CLSND	Clear to Send
7	AB	GND	Signal Ground
20	CD	DTR	Data Terminal Ready

Figure 2-3 Data Communication Signals

2.3 Circuit Description - 129-289

Initialization

At power-on, capacitor C7 charges by a resistor that is internal to the MCU. Diode CR1 discharges capacitor C7 in case of an interruption of power, and resets the MCU.

Two eight-position DIP, switches S1 on the rear panel and S2 on the logic board, are loaded into the MCU on power-up. Resistor pack RN1 (10k) holds the switch inputs high unless a switch is turned on.

The load strobe signal (LOPT*) loads the switch settings into the parallel to serial shift registers UE1 and UE2 (74C165). This takes place only on power-up. After the data is loaded into UE1 and UE2 the poll signal pulses and loads the data into the MCU on the SOPTIN pin. (The poll signal is also used for the keyboard and can be used for loading the switches because the keyboard is not yet active.)

Keyboard Interface

The serial ASCII encoded keyboard is connected to the terminal by a four wire cable carrying signal ground, chassis ground, +12 volts, and an input/output line. The keyboard is polled by the MCU telling the keyboard that it can send data. If a key has been pressed, the serial data is returned on the same line. The returning keyboard data is buffered and cleaned up by UB1 (74LS14) and sent to UD-5 and UC-5. UD-4 (74LS123, one shot) is used to clock data into UC-5 (74LS164, serial to parallel converter) causing the keyboard data to appear on the KB0/KB7 lines allowing it to be loaded into the MCU.

The alarm command (Control-G) will cause two poll pulses in immediate succession to activate the alarm on the keyboard.

Inter Element Communications

When the MCU wants control of the bus, it sends a bus request asking permission to send data on the bus to the CRT/DMAC or the display buffer. This request is by means of the BREQ line. The CRT/DMAC answers with a bus grant (HINT) which allows the MCU to send the data. The MCU can only send (write) data.

The display memory is written to by the MCU and read by the CRT/DMAC unless the terminal is executing an erase function, then the CRT/DMAC writes "blanks" to the display memory. WE* (write enable) from the CRT/DMAC enables the memory so that data can be written into it. OE* (output enable) allows the memory to force data onto the bus. The RAM (A4,6116) used on the 129-289 is a static memory and needs no refreshing but needs an Address Latch (A3, 74LS374). The Address Latch (A3) takes data and address from the AD Bus and latches address using the Address Strobe Signal (AS*) from the MCU. Address can be read on the AD bus on the trailing edge of AS*, and data can be read on the trailing edge of DS*.

The CRT/DMAC has programmable registers that are addressed by the MCU as memory mapped space. At power-up, the cursor address and character display (attribute latch) registers are set. During operation the address registers and attribute latch are updated and the erase register is programmed if an erase function is received. All attributes are implemented internally except for half intensity which sets the 1/2 INT pin high, producing a signal that cuts the video output in half. All attributes are implemented on a per character basis determined by the state of the tag bit.

The CRT/DMAC normally has control of the system bus, accessing each character of the display memory on each scan line to refresh the screen. When the MCU requires the bus, it issues a bus request (BREQ*). At the end of scan line eight of the current character row, the CRT/DMAC issues a horizontal interrupt (HINT*) strobe and tri-states its address and data lines for the equivalent of two scan lines (64 usec) after which the CRT/DMAC resumes control. If BREQ* comes during an erase, the erase is completed before the buses are released.

When the terminal receives an erase or scroll function, the CRT/DMAC erase register is programmed for end of line or end of page with the current cursor address used for the erase start. Erase screen uses the top of screen address. The CRT/DMAC fills RAM spaces with "blanks" and erase is accomplished during screen refresh. When the screen scrolls, the top line is erased, the top of screen address is incremented and the erased line becomes the new 24th display line.

The video and half intensity signals from the CRT/DMAC are combined, buffered and sent to the CRT monitor. Variable resistor (R20) controls the contrast; a variable resistor in the monitor circuit controls the brightness.

Horizontal and vertical drive signals (VDRIIVE and HDRIVE) are schmitt-triggered on UB1 to drive the monitor. The screen is covered in 240 scan lines, at 60 Hz retrace is timed at 20 scanned lines, at 50 Hz retrace is 72 lines.

The Viewpoint communication support circuitry is fairly simple. The MCU has an internal UART that supports transmit data, receive data, clear to send (CTS) and request to send (RTS). The MCU only requires circuitry to make these signals compatible with EIA voltage levels (UC1, UC2). Diodes CR2, CR3, CR4 and CR5 are to prevent damage by clamping input signal voltages.

2.4 Circuit Description - 129-295

Initialization

At power-on, capacitor C7 charges by a resistor that is internal to the MCU. Diode CR1 discharges capacitor C7 in case of an interruption of power, and resets the MCU.

Two eight-position DIP, switches S1 on the rear panel and S2 on the logic board, are loaded into the MCU on power-up. Resistor pack RN1 (10k) holds the switch inputs high unless a switch is turned on.

The load strobe signal (LOPT*) loads the switch settings into the parallel to serial shift registers UE1 and UE2 (74C165). This takes place only on power-up. After the data is loaded into UE1 and UE2 the poll signal pulses and loads the data into the MCU on the SOPTIN pin. (The poll signal is also used for the keyboard and can be used for loading the switches because the keyboard is not yet active.)

Keyboard Interface

The serial ASCII encoded keyboard is connected to the terminal by a four wire cable carrying signal ground, chassis ground, +12 volts, and an input/output line. The keyboard is polled by the MCU telling the keyboard that it can send data. If a key has been pressed, the serial data is returned on the same line. The returning keyboard data is buffered and cleaned up by UB1 (74LS14) and sent to UD-5 and UC-5. UD-5 (74LS123, one shot) is used to clock data into UC-5 (74LS164, serial to parallel conv) causing the keyboard data to appear on the KB0/KB7 lines allowing it to be loaded into the MCU.

The alarm command (Control-G) will cause two poll pulses in immediate succession to activate the alarm on the keyboard.

Inter Element Communications

When the MCU wants control of the bus, it sends a bus request asking permission to send data on the bus to the CRT/DMAC or the display buffer. This request is by means of the BREQ line. The CRT/DMAC answers with a bus grant (HINT) which allows the MCU to send the data. The MCU can only send (write) data.

The display memory is written to by the MCU and read by the CRT/DMAC unless the terminal is executing an erase function. Then the CRT/DMAC writes "blanks" to the display memory. WE* (write enable) from the CRT/DMAC enables the memory so that data can be written into it. OE* (output enable) allows the memory to force data onto the bus. Address can be read on the bus on the trailing edge of AS*, and data can be read on the trailing edge of DS*. The display memory used on the 129-295 is a static memory and therefore needs no refreshing. This RAM (A4,616) needs address latched from the bus, IC A3, 74LS374 does that latching. When the Address Strobe Signal (AS*) pulses, the address on the AD bus is latched onto the Address Bus for the display memory. The AS* signal is generated by the MCU.

The CRT/DMAC has programmable registers that are addressed by the MCU as memory mapped space. At power-up, the cursor address and character display (attribute latch) registers are set. During operation the address registers and attribute latch are updated and the erase register is programmed if an erase function is received. All attributes are implemented internally except for half intensity which sets the 1/2 INT pin high, producing a signal that cuts the video output in half. All attributes are implemented on a per character basis determined by the state of the tag bit.

The CRT/DMAC normally has control of the system bus, accessing each character of the display memory on each scan line to refresh the screen. When the MCU requires the bus, it issues a bus request (BREQ*). At the end of scan line eight of the current character row, the CRT/DMAC issues a horizontal interrupt (HINT*) strobe and tri-states its address and data lines for the equivalent of two scan lines (64 usec) after which the CRT/DMAC resumes control. If BREQ* comes during an erase, the erase is completed before the buses are released.

When the terminal receives an erase or scroll function, the CRT/DMAC erase register is programmed for end of line or end of page with the current cursor address used for the erase start. Erase screen uses the top of screen address. The CRT/DMAC fills RAM spaces with "blanks" and erase is accomplished during screen refresh. When the screen scrolls, the top line is erased, the top of screen address is incremented and the erased line becomes the new 24th display line.

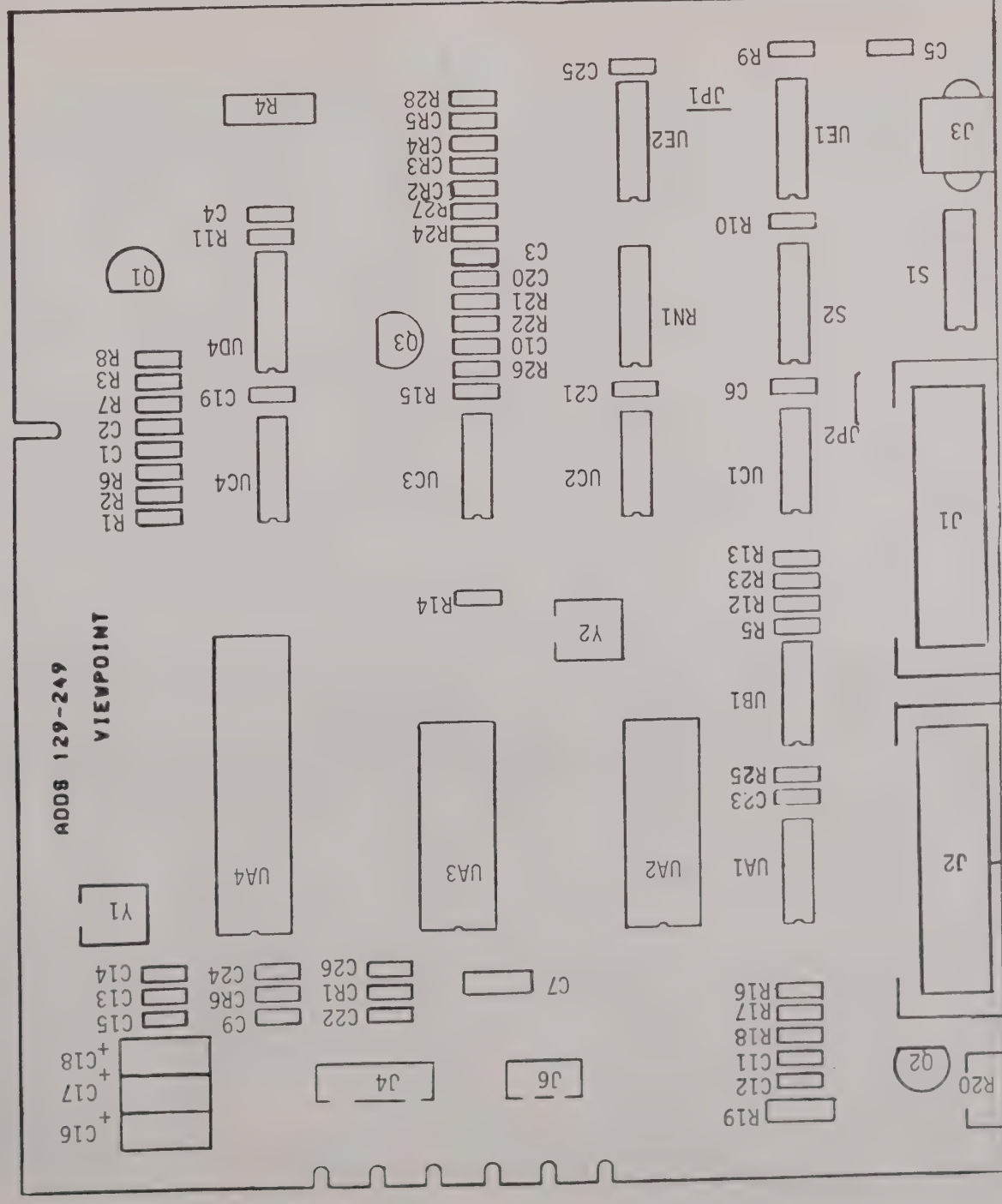
The video and half intensity signals from the CRT/DMAC are combined, buffered and sent to the CRT monitor. A variable resistor controls contrast; a variable resistor in the monitor circuit controls brightness.

Horizontal and vertical drive signals (VDRIVE and HDRIVE) are schmitt-triggered on UBI to drive the monitor. The screen is covered in 240 scan lines, at 60 Hz retrace is timed at 20 scanned lines, at 50 Hz retrace is 72 lines.

The Viewpoint communication support circuitry is fairly simple. The MCU has an internal UART that supports transmit data, receive data, clear to send (CTS), request to send (RTS) and Aux on. The MCU only requires circuitry to make these signals compatible with EIA voltage levels. IC's UC1, 1488 and UC2, 1489 are used as voltage level shifters to connect the MCU to the EIA port. The 129-295 has the capability of turning the Aux port On and Off under software control. This feature is controlled by the "Aux-ON" signal (pin 10) on the MCU. Diodes CR2, CR3, CR4 and CR5 are to prevent damage by clamping input signal voltages.

SYM	DESCRIPTION	DATE	APPROVAL
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SYM	DESCRIPTION	DATE	APPROVAL
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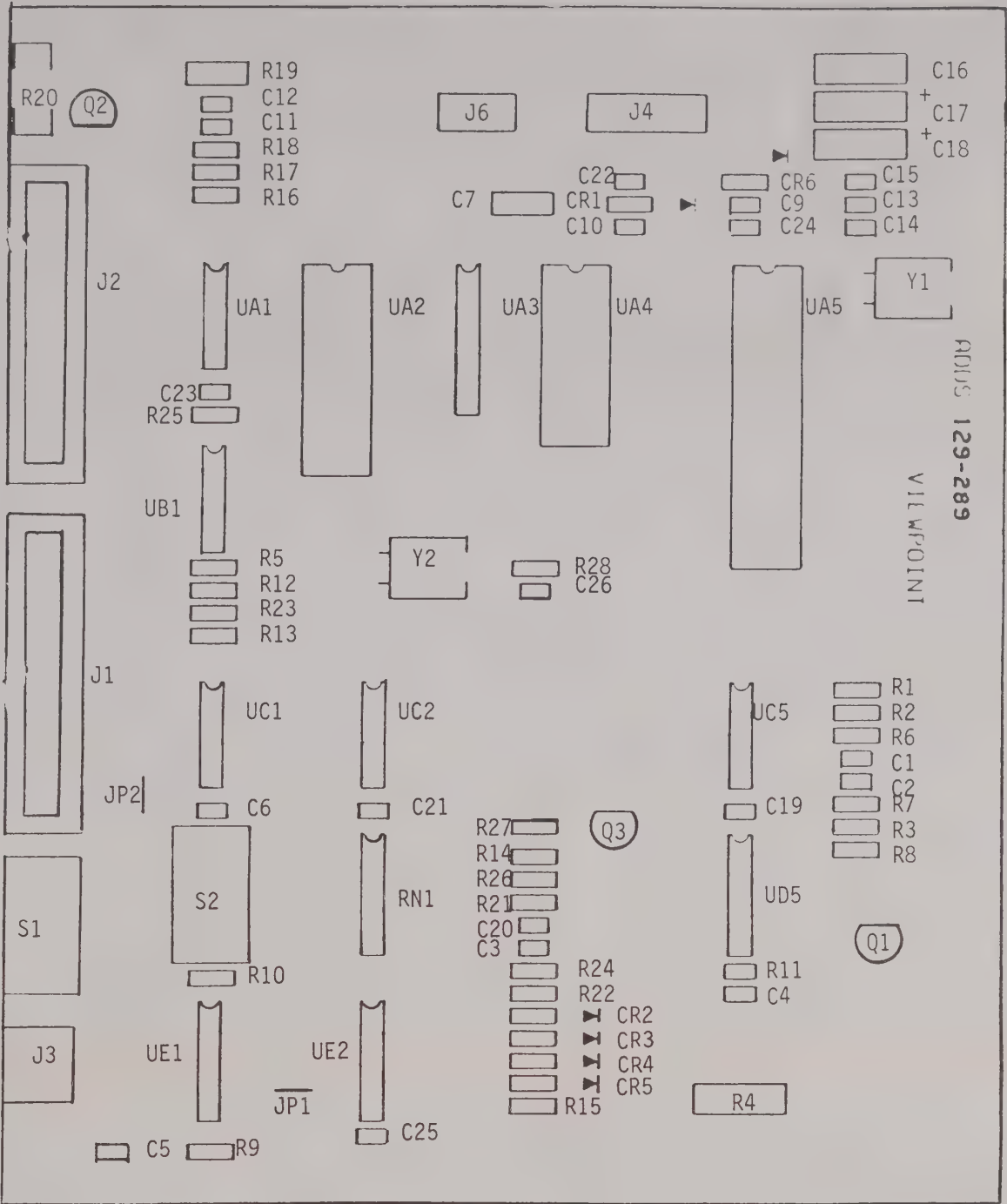
SEE SEPARATE BOM

APDS

ASSEMBLY DRAWING LOGIC VIEWPOINT

						TOLERANCES				ANGLES	
FRACTIONS		DECIMALS				SPL ±		SPL +		-	
+	-										
						DO NOT SCALE DRAWING 3					
						DRAWN				DATE	
						CHECKED					
						ENGR					
						APPROVED					
NEXT ASSY	VIEWPOINT MANUAL					USED ON		QTY			

2-13/2-14



SEE SEPARATE BOM

ADDS Applied Digital Data Systems, Inc.
Haupeauge, New York

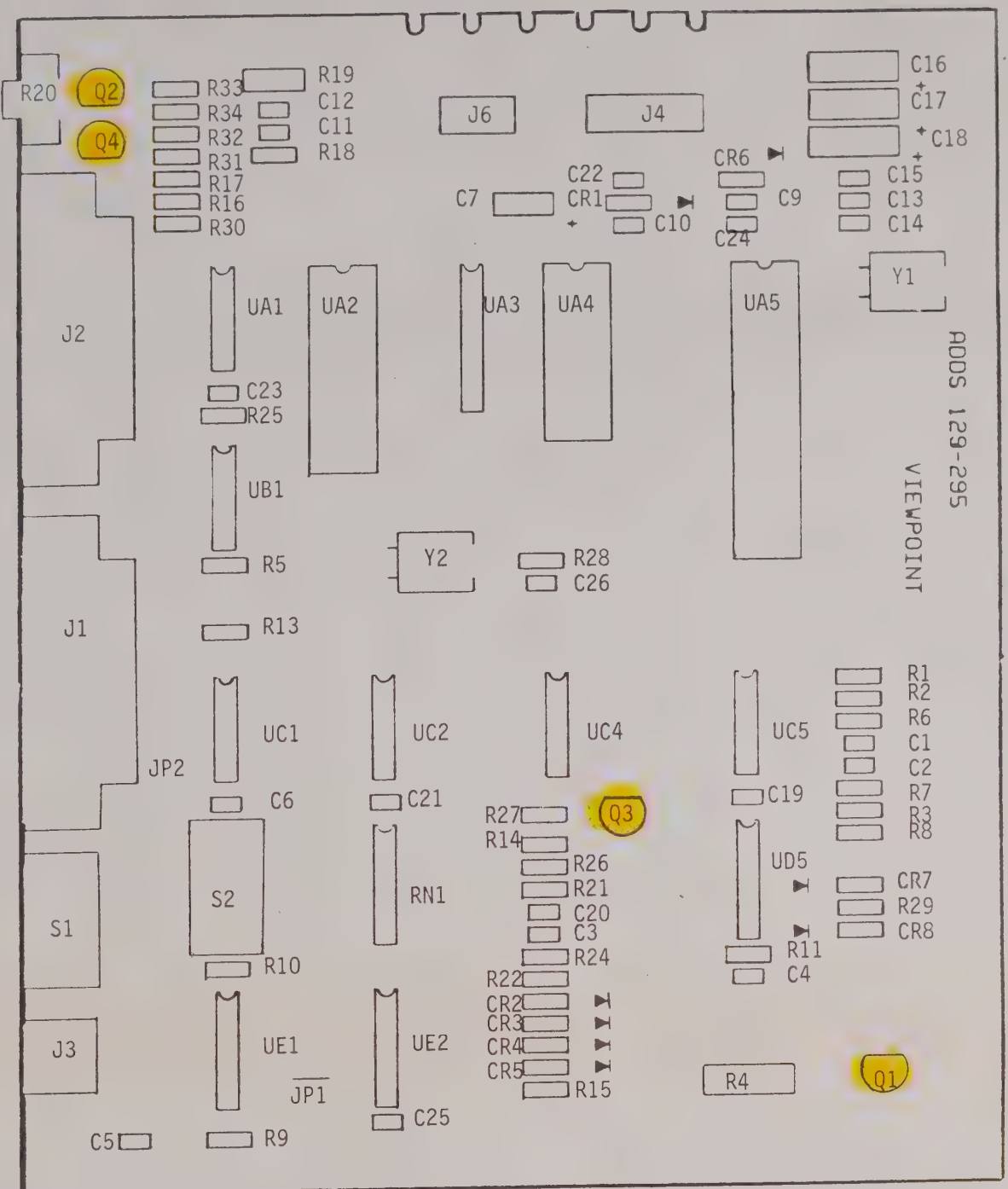
PC BOARD ASSEMBLY

Figure 2-5
LOGIC "B"

TOLERANCES		ANGLES	
FRACTIONS	DECIMALS	FRACTIONS	DECIMALS
+	+	+	+
-	-	-	-
DO NOT SCALE DRAWING			
DRAWN		DATE	
CHECKED			
ENGR			
APPROVED			
VIEWPOINT MANUAL			
USED ON			
NEXT ASSY			
QTY			
DWG NO			
129-28900			
SIZE			
B			
SCALE 1:1			
SHEET 1 OF 1			
REV			
B			

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

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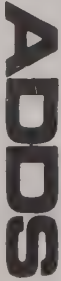
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
1	PILOT EN051-11430	7-22-81	
2	EN051-11476 WAS 'C' SIZE	8-28-81	

SEE SEPARATE BOM

ADDS
Applied Digital Data Systems, Inc.
Hauppauge, New York

PRINTED CIRCUIT BOARD ASSEMBLY LOGIC

			TOLERANCES		
FRACTIONS	DECIMALS	ANGLES			
+	3PL +	+			
-	3PL -	-			
			DO NOT SCALE DRAWING		
DRAWN			DATE		
W.M.					
CHECKED					
ENGR					
VIEW POINT					
USED ON					
NEXT ASSY					
QTY					
APPROVED					



Applied Digital Data Systems, Inc.
Hauptaage, New York

PRINTED CIRCUIT BOARD
ASSEMBLY LOGIC
Figure 2-6

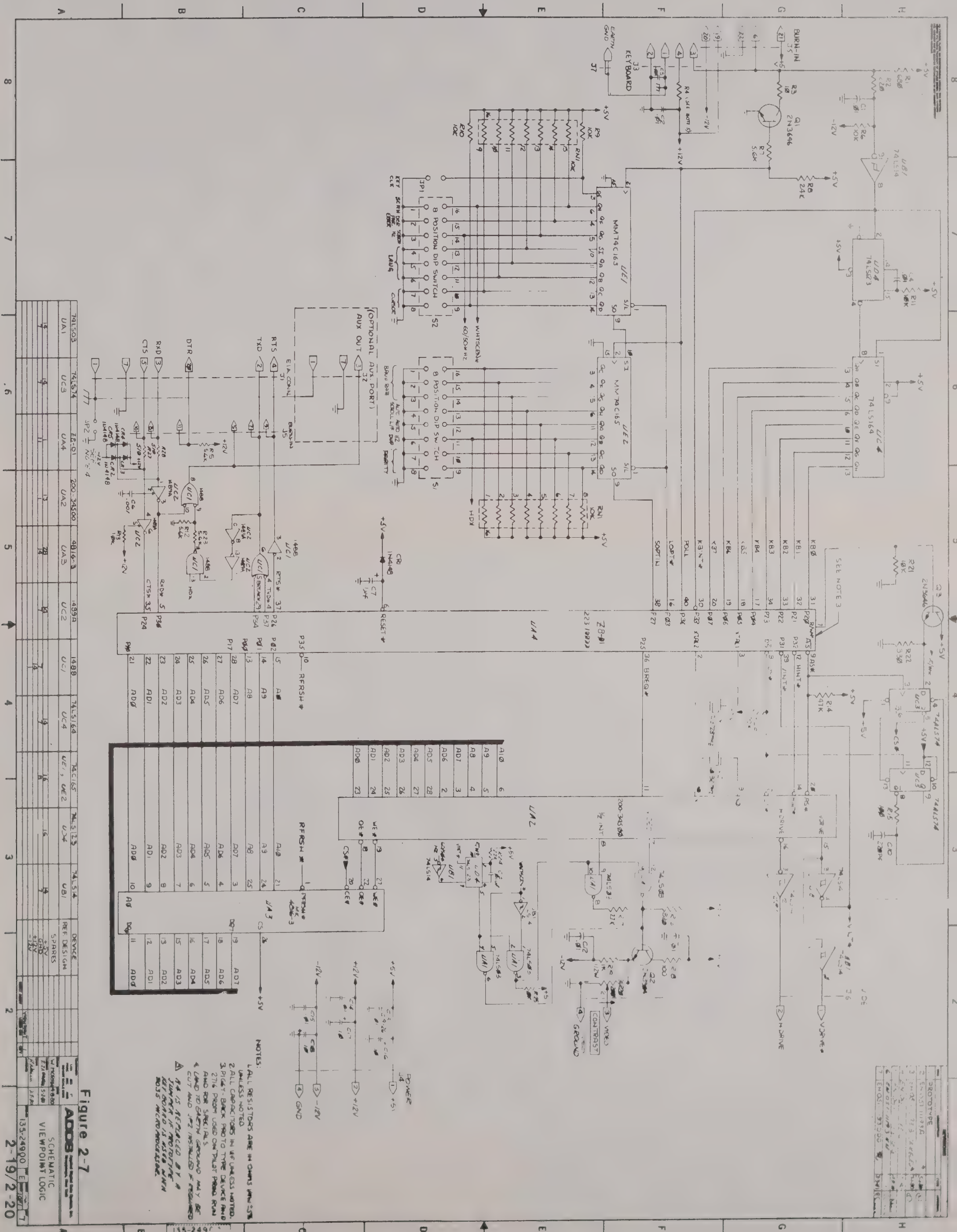
DWG NO 129-29500

SIZE B

SCALE 1-1

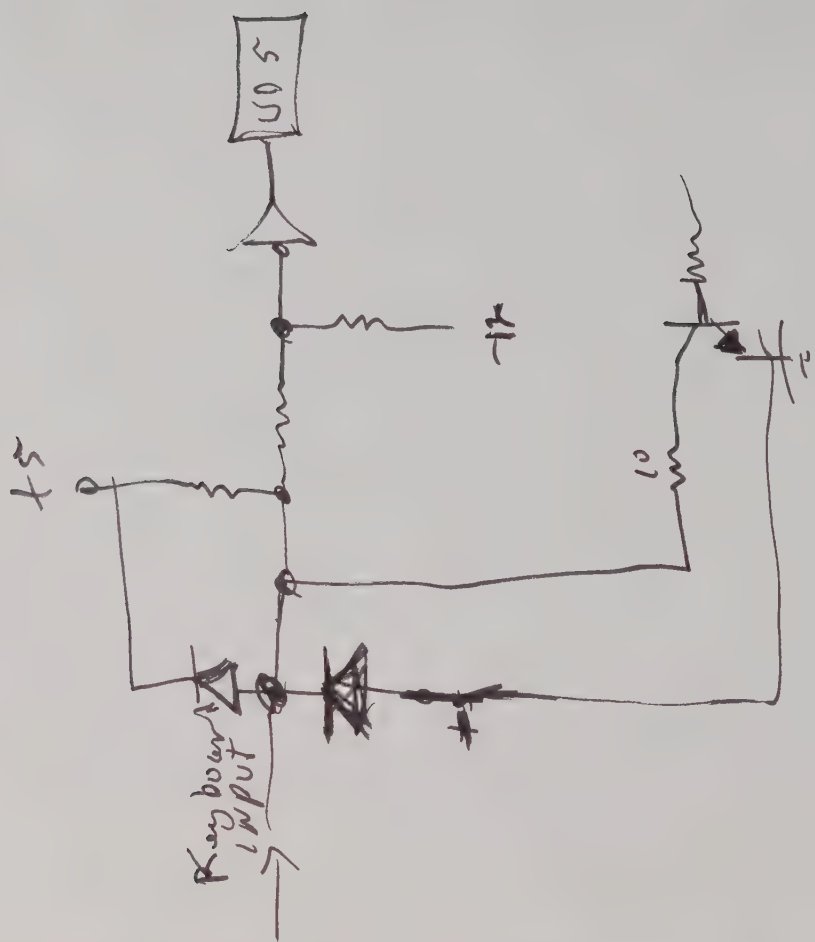
SHEET 1 OF 1

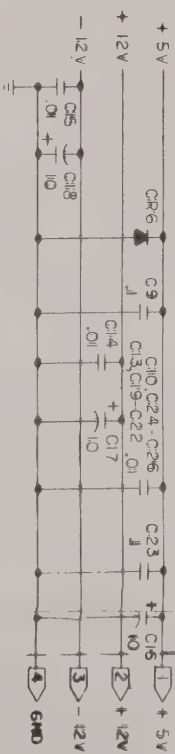
REV 2



Psta-le Blanc

929 4214





- 135-28900

ADDOS
Applied Digital Data Systems, Inc.
Hawthorne, New York

135-28900	D	10/1
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SECTION 3: THEORY OF OPERATION - VIDEO/POWER SUPPLY

3.1 General

The Video/Power Supply circuits of the Viewpoint system are mounted on a single printed circuit card. The Theory of Operation is divided into the Power Supply section and the Video section. For the following discussion refer to the Video and Power Supply schematics and layouts.

3.2 Power Supply

The power supply section provides the following output voltages and currents:

<u>Supply</u>	<u>Used by Viewpoint</u>
+ 15V @ 1.5 A max.	850MA nominal
+ 12V @ 0.30A nom.	100MA nominal
+ 5V @ 1.0 A max.	300MA nominal
- 12V @ 0.1 A nom.	20MA nominal

Each output is regulated by a three terminal I.C. regulator mounted to the heat sink. The transformer secondary is connected to the Video/Power Supply board by J2.

3.2.1 Circuit Operation

120 VAC fed to the T1 primary is stepped down to suitable input voltage levels.

+15 Volts CR51 and CR52 form a full-wave rectifier. The output is filtered by C52. A ripple voltage of 2V p-p at 100 or 120 Hz will be present at this point riding on +22 VDC. U51 regulates this voltage to 15 volts and R55, R56 and R57 provide additional current around the regulator. C57 provides added filtering.

+12 Volts U54 operates from the same filtered supply as U51. Its output is further filtered by C55.

+5 Volts CR53 and CR54 form a full-wave rectifier. The output is filtered by C51. A ripple voltage of 2V p-p at 100 or 120 Hz will be present at this point riding on 9.5 VDC. U52 regulates this voltage to 5 volts and C54 provides additional filtering. R58, VR57 and Q51 form a crowbar overvoltage protection circuit. VR57 conducts when the output of U52 reaches 6.7 VDC nominal. It fires SCR Q51, dropping the output voltage to zero. Power must be turned off to reset Q51. J6 feeds +5V to the front panel LED indicating power on.

-12 Volts CR55 and CR56 form a full-wave rectifier. R51 limits the current through the diodes and provides some degree of stability. C53 filters the output of CR55 and CR56. U53 regulates this voltage to -12 VDC. CR58 protects the regulator from reverse voltage spikes. C56 further filters the output.

3.2.2 Miscellaneous

The T1 input is fused at 1A and has the core grounded to minimize line noise coupling through T1. Two transformers are available:

#350-03800....120 VAC, 50 or 60 Hz.

#350-04100....100, 120, 220 or 240 VAC, 50 or 60 Hz.

Video/Power Supply

3.3 Video

3.3.1 Circuit Description

The video section may be broken into 6 parts:

Vertical Deflection Circuit
Horizontal Deflection Circuit
Video Circuit
High Voltage Circuit
CRT Controls
CRT

Refer to figure 3-1.

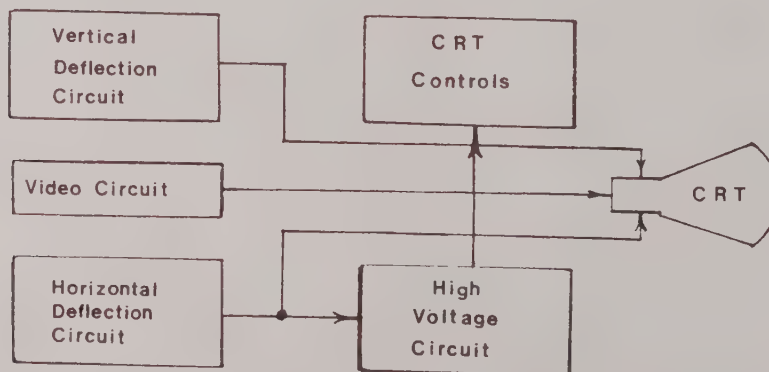


Figure 3-1 Video/Power Supply Block Diagram

3.3.2 Circuit Operation

Incoming synchronizing signals from the Logic Board control the vertical and horizontal deflection circuits. The video signal, also from the logic board, is amplified and applied to the cathode of the CRT. The horizontal signal is fed to the flyback transformer which provides the boost voltage and CRT anode high voltage. The focus and brightness potentiometers control secondary CRT control grids. A more detailed discussion of each section follows.

3.3.3 Vertical Deflection

Q2 is a programmable unijunction transistor connected as a relaxation oscillator. It runs slower than required so that the negative edge of the incoming vertical trigger pulse can synchronize the video data with the vertical sweep. The sweep time constant is determined by R15, C5 and C6. Transistors Q7 and Q3 provide current gain. R21 provides adjustable feedback and corrects vertical linearity. R24 adjusts the amount of current fed to Q4. CR2 provides temperature compensation and L2 allows DC for stage operation while preventing vertical sweep signal from being fed back to the +15 volt supply. C7 provides an AC path to ground for the vertical deflection signal but prevents DC flow in the vertical deflection coil so that saturation will not occur.

3.3.4 Horizontal Deflection

The horizontal drive signal (15.6 KHZ) must be as shown on the schematic. The 23 usec high time causes the Darlington amplifier, Q8 and Q5, to conduct current through the T1 primary. During this time, Q6 is driven off by the T1 secondary and pin 8 of T2 drives current through CR8. During the remaining 41 usec of the horizontal line, the input signal is low, the Darlington amplifier is cut off and the T1 secondary delivers its stored energy to the base of Q6, holding Q6 in saturation.

At the end of the cycle Q6 turns off and energy stored in the horizontal deflection yoke and T2 cause the voltage across C9 to rise.

3.3.6 High Voltage Circuits

The other windings of T2 step up the input voltage to levels required for CRT control:

CR6 and C11 rectify and filter the pin 3 voltage to provide +450VDC.

CR5 and C17 rectify and filter the pin 2 voltage to provide +38VDC. CR4 and C16 rectify and filter the pin 1 voltage to provide -125VDC. The flyback (high voltage) transformer assembly has a high voltage diode built in to rectify the 14KV CRT anode voltage. The CRT itself provides the filter capacitance.

L4 is a coil with a permanent magnet core which linearizes the current through the horizontal deflection coil. L1 adjusts the width of the display. C24 provides D.C. isolation. RC network (R49, C28) in parallel with the inductors, prevents excessive ringing.

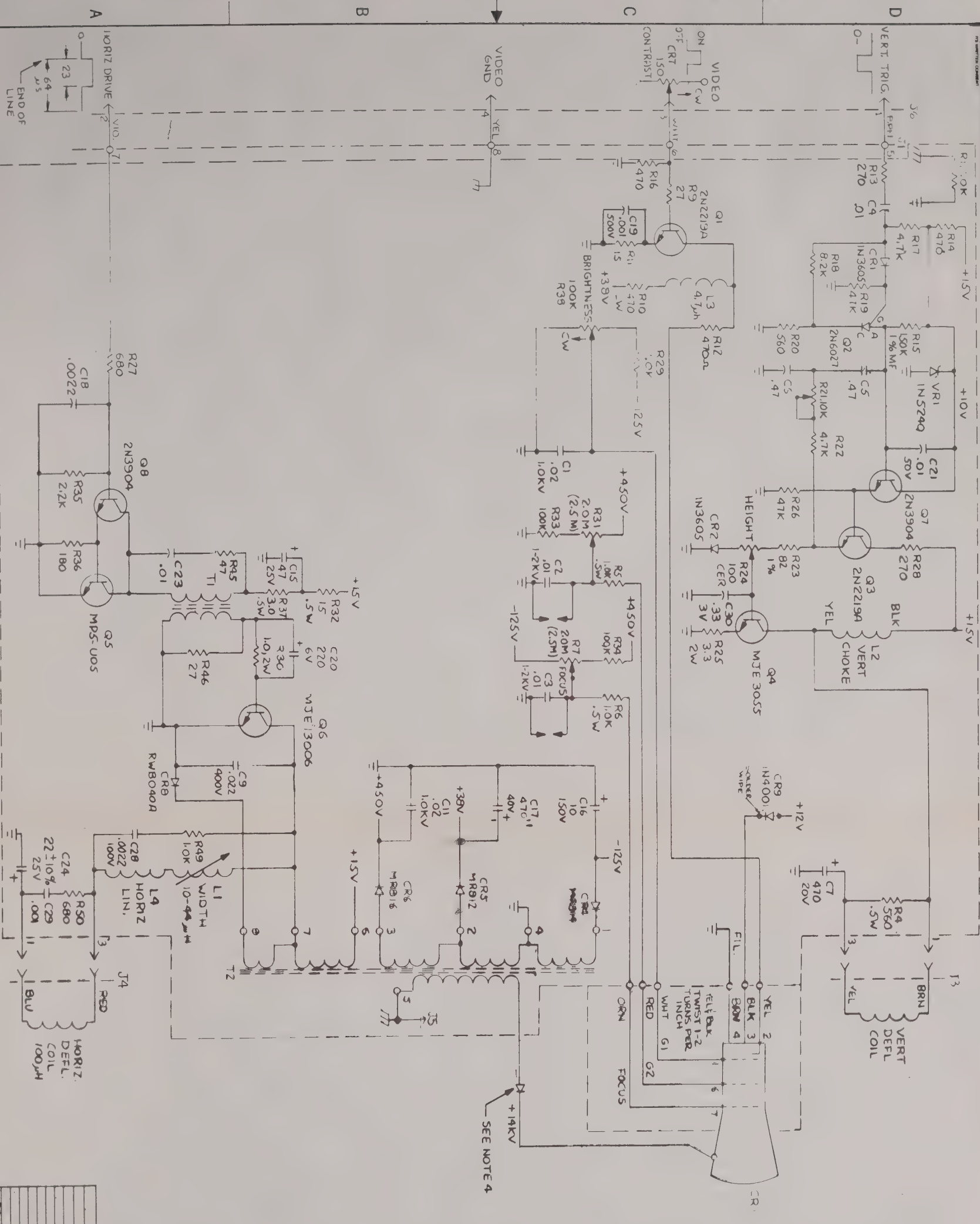
3.3.5 Video Circuit

Q1 is part of a common emitter amplifier which inverts the incoming video signal and applies it to the CRT cathode. C19 and R11 form a high pass filter in the emitter circuit and L3 prevents video signal from getting back onto the +38 volt supply.

3.3.6 CRT Controls

The contrast control (located on the rear panel) adjusts the amount of video drive signal from the logic board. The +450 volt supply provides control grid voltages for the G2, focus and control grid electrodes of the CRT. Potentiometers R31, R7 and R38 adjust these voltages respectively. The G2 (R31) potential may be adjustable or fixed. If adjustable, the wiper of G2 should be adjusted for 240 VDC, referenced to ground, with the contrast control adjusted fully counter clockwise.

REVISIONS			
NO.	DESCRIPTION	DATE	APPROVAL
1	PROT-EN051-11-23-88	11/23/88	XX
2	EN051-11193-88B	11/23/88	XX
REL FOR PRODUCTION			



NOTES:
UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES IN OHMS
2. CAPACITANCE VALUES IN MICROFARADS
3. RESISTORS ARE 1/4W
4. DIODE INCLUDED IN TRANSFORMER ASSEMBLY

Figure 3-2

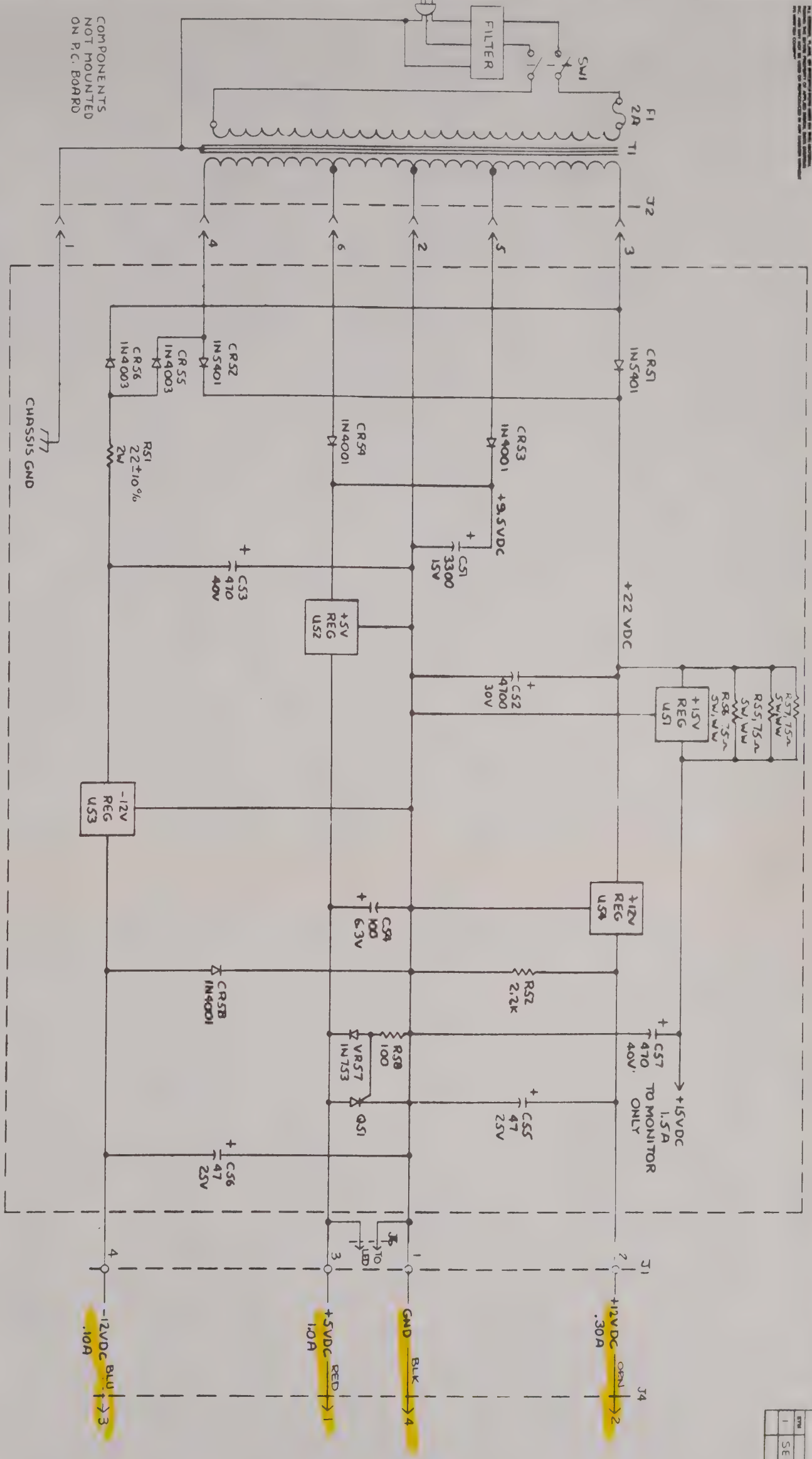
ADDIS

SCHEMATIC
VIDEO C/POWER SUPPLY

ITEM	DESCRIPTION	QTY	REMARKS
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2	VIDEO C/POWER SUPPLY	1	
3	VIDEO C/POWER SUPPLY	1	
4	VIDEO C/POWER SUPPLY	1	
5	VIDEO C/POWER SUPPLY	1	
6	VIDEO C/POWER SUPPLY	1	
7	VIDEO C/POWER SUPPLY	1	
8	VIDEO C/POWER SUPPLY	1	
9	VIDEO C/POWER SUPPLY	1	
10	VIDEO C/POWER SUPPLY	1	
11	VIDEO C/POWER SUPPLY	1	
12	VIDEO C/POWER SUPPLY	1	
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98	VIDEO C/POWER SUPPLY	1	
99	VIDEO C/POWER SUPPLY	1	
100	VIDEO C/POWER SUPPLY	1	

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REVISIONS		
REV	DESCRIPTION	DATE
1	SEE SHEET 1 FOR REV	2/8/80



OUTSIDE
UNITS ARE ON OTHER SIDE

MSJ 1300L
MSJ 3055
UA 79M12A
UA 7805C
UA 78M12
UA 7815
BCB -12V
56I +12V
22V

COMPONENTS
NOT MOUNTED
ON P.C. BOARD

Figure 3-3

ADDON

SCHEMATIC
VIDEO/POWER SUPPLY

REV	DESCRIPTION	DATE	BY	CHKD	APP'D
1	SEE SHEET 1 FOR REV	2/8/80			

135-28500

8 7 6 5 4 3 2

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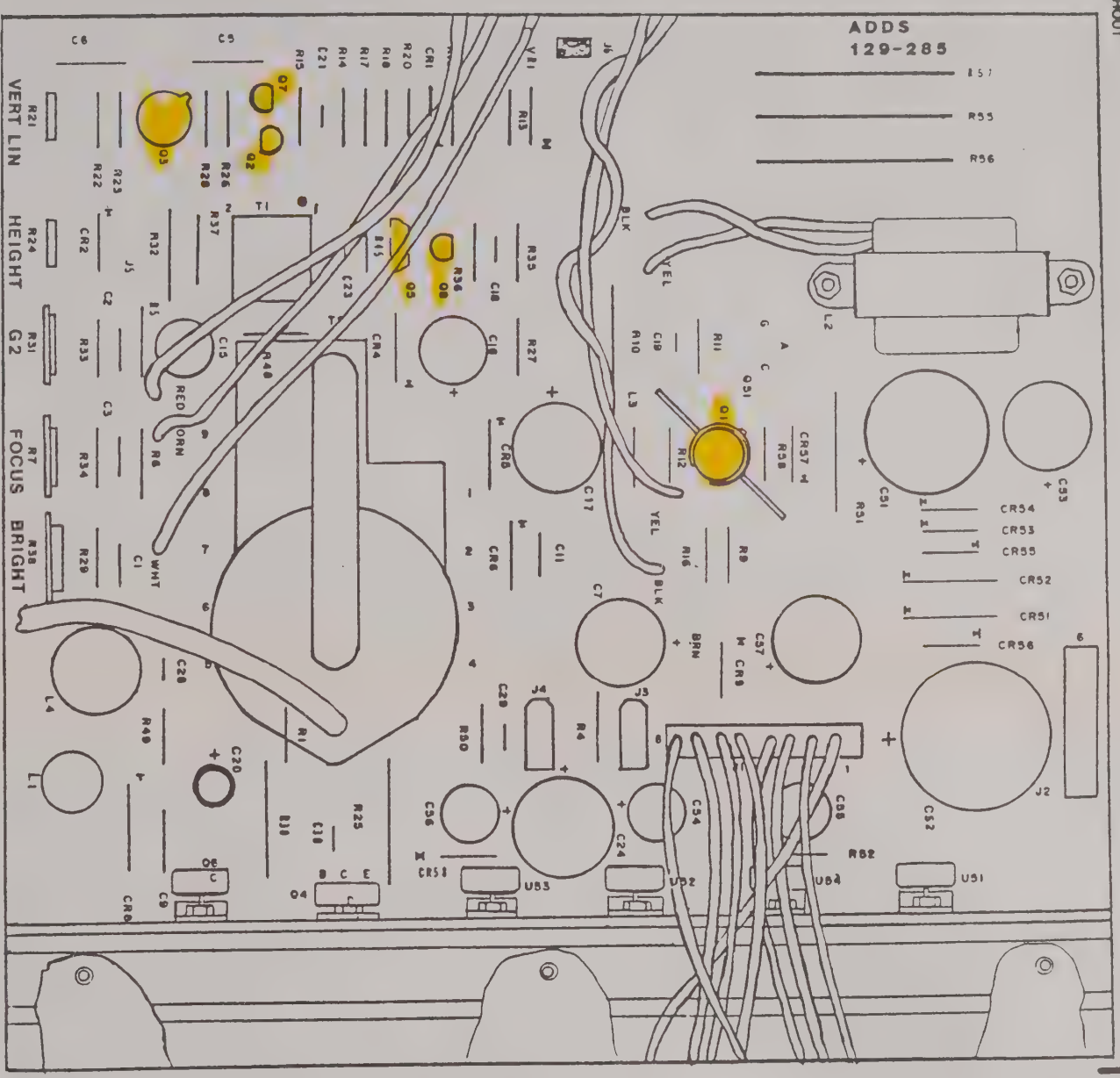


Figure 3-4

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

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SECTION 4: THEORY OF OPERATION - KEYBOARD

4.1 General

The Viewpoint keyboard is a capacitive keyboard with a serial interface. It is connected to the terminal by a four wire coiled cable which carries the supply voltages, grounds and signal voltages. The keyboard logic is microprocessor controlled and consists of four integrated circuits. A capacitive keyboard matrix eliminates mechanical contact wear. For the following discussion refer to the Keyboard Block Diagram (Figure 4-1) and the Keyboard Schematic and layout.

4.2 Circuit Operation

At power on, the keyboard is sent a request for data (POLL pulse) via the I/O* line. It enters the micro processor (Z5) through Z7 (which buffers the signals and removes noise). Z5 places a four bit keyboard matrix address byte on lines P10, P11, P12 and P13. This information is loaded when the strobe pulse from the microprocessor (P20) goes low. At the same time, Z8 is reset.

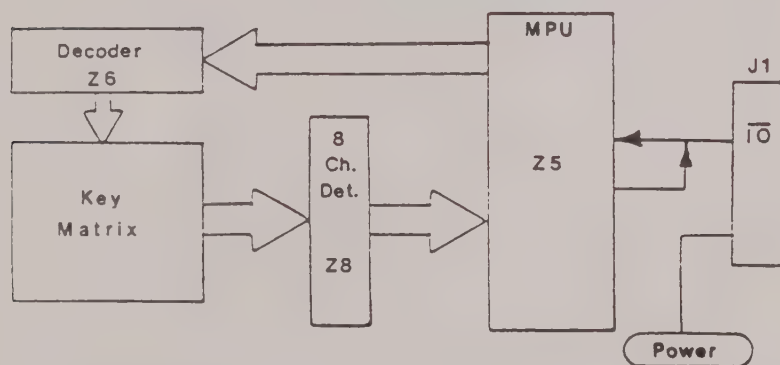


Figure 4-1 Keyboard Block Diagram

Z6 is a four-to-sixteen line decoder. The selected line will be pulled high and then low. Any key pressed will couple that pulse to Z8. Z8 is an eight channel capacitive switch detector which conveys the selected key data to the microprocessor.

The microprocessor then sends the key character data during the correct time interval after the polling pulse.

The serial data leaves the microprocessor, is buffered by Z7 and Q3 and leaves the keyboard via the I/O line.

A piezo ceramic audio transducer produces the bell tone when commanded by the microprocessor. This command is given when the alarm pulse is received (See Timing Diagram, Figure 4-2).

+12 volts is used to power the audio transducer and Z4 (a three terminal regulator) regulates the +5 volts for the remaining circuitry.

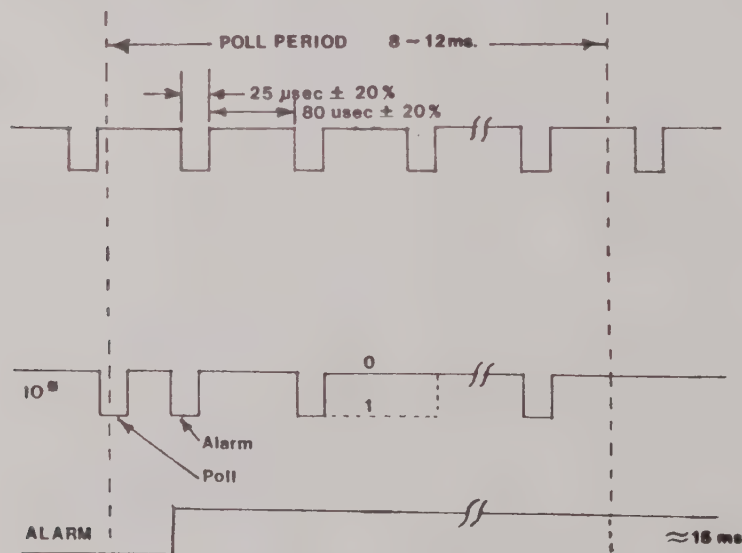


Figure 4-2 Keyboard Timing Diagram

ALL DESIGNS, PLANS, OR SPECIFICATIONS USED ON THIS MATERIAL REMAIN THE ENTIRE PROPERTY OF APPLIED DIGITAL DATA SYSTEMS INC AND MAY NOT BE USED OR REPRODUCED IN ANY MANNER WITHOUT ITS WRITTEN CONSENT

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	RELEASED FOR PRODUCTION	5-8-81	BB <i>[Signature]</i>

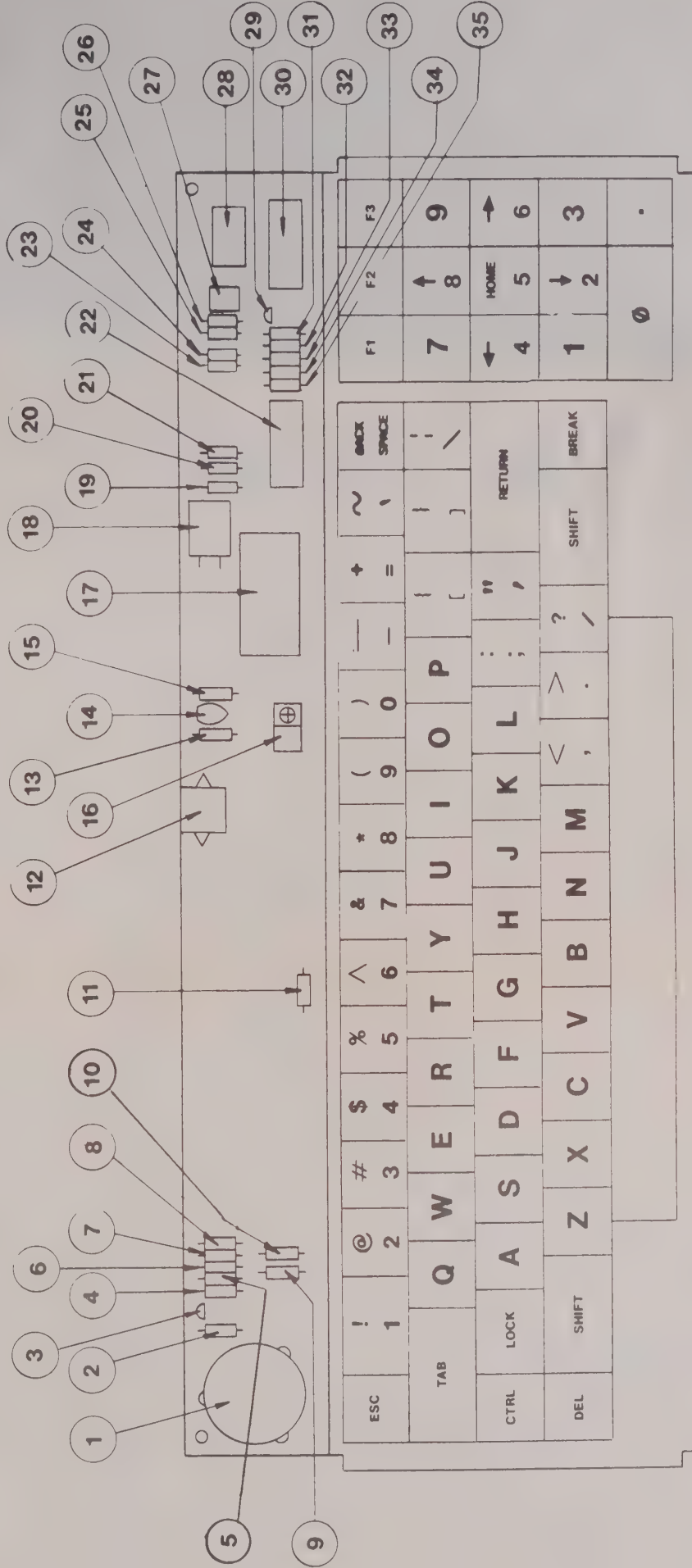


Figure 4-3

ADDS Applied Digital Data Systems, Inc.
Hempstead, New York

VIEWPOINT
KEYBOARD
ASSEMBLY[illegible]

SECTION 5: TROUBLESHOOTING

5.1 General

The following section outlines methods for locating causes of equipment malfunction. Service technicians should familiarize themselves with circuit operation before troubleshooting. Refer to the schematics and parts layout.

5.1.1 CAUTION:

Before removing or installing PC boards, turn power OFF and unplug the power cord.

Observe the following safety measures:

When working near the CRT, avoid striking or dropping the picture tube.

The high voltage (flyback) transformer can cause a severe shock. Exercise extreme caution when making dynamic measurements.

Before servicing the CRT or Video/Power supply board, discharge the CRT properly.

Observe proper grounding procedures when taking measurements and when removing/replacing MOS type devices.

5.1.2 Power Up

At power up, the audio transducer should sound. This indicates that the logic card MCU has sent the alarm pulse to the keyboard and is ready for keyboard data. Possible problems are listed below.

On power-up

<u>Indication</u>	<u>Probable Cause</u>
1. Buzzer OK	1. CRT/DMA Controller (bad erase function)
Garbage on screen	2. MCU (bad drives) 3. RAM (no data out)
2. Buzzer stays on	1. Bad alarm on keyboard bad POLL signal
3. No BREQ	MCU

<u>Indication</u>	<u>Probable Cause</u>
4. No HINT	CRT/DMAC
5. Bad AS	Sync scope on MCU for a MCU write to RAM. Sync scope on CRT/DMAC for DMA write to RAM
6. Switch data	Check 17 pulses of SOPTIN

Further difficulties must be isolated to the specific board.

5.1.3 Isolation

Check the following in order to localize the difficulty to the board level:

A. Check power input to be correct for unit configuration.

ex. 120VAC for 120VAC Model (See Specifications)

B. Power supply outputs are present and within specifications. (See Power Supply Schematic and Section 3.2).

C. Keyboard is receiving the following:

1. +12 volts
2. $\overline{IO}$ (Polling pulses)
3. GND
4. Chassis GND

D. Video Board is receiving the following:

1. Vertical Trigger
2. Horizontal Drive
3. Video Signal
4. Power Supply Voltages

E. CRT has the following:

1. Proper electrode voltages and signals
(See Video Schematic)
2. High Voltage

5.1.4

Once the problem has been isolated, the individual module may be replaced or returned to ADDS for service.

Should further troubleshooting be necessary, refer to the individual module sections. See Appendix D for list of recommended tools.

5.2 Logic Card

5.2.1 General

Because of the complexity of the Logic Card, it is recommended that troubleshooting be performed functionally to the chip level. Any MCU or CRT/DMAC malfunction will require the return of the Logic Card to ADDS.

Since the logic board generates virtually all of the Viewpoint control signals, the only inputs are the power supply voltages and the keyboard data. These should be checked first with an oscilloscope. Refer to Figure 5.1 for system fault analysis.

CAUTION:

The Logic Card must be removed from the system before the CRT anode is discharged. Failure to do so may damage the MOS chips.

<u>Symptom</u>	<u>Probable Cause</u>	<u>Remedy</u>
Picture fails to appear after warm up	a) Power Supply b) Poorly adjusted Contrast c) Faulty video board	a) Repair Video/Power Supply b) Adjust contrast c) Replace P.C. board
Unit comes up with random characters on screen	Faulty LSI on Logic Board	a) Replace UA2, UA3, UA4 b) Replace board
Unit gets hot and shuts down	Bad Video/Power Supply	Replace Video/Power Supply
Character distorted: lack of, or extra, dots	Bad Logic Card	a) Replace I.C. UA2, UA3 b) Replace Logic board
One or more characters cannot be entered from keyboard	a) Keyboard b) Keyboard cable or connector c) Bad P.C. board	a) Replace keyboard b) Replace cable or connector c) Replace P.C. board
Only one character cannot be entered	Bad key Switch.	Replace key switch
Screen torn or Distorted	a) Faulty video b) Faulty Power Supply	a) Replace Video/Power Supply board b) same
Screen Flickers	Switch set for improper frequency	Set switch S2-3 for frequency used (50 or 60 Hz)
One cursor control fails to work	Faulty key module	Replace key module
No cursor visible	Bad Logic board	Replace Logic board
Cannot enter data	a) Keyboard cable faulty b) If unit is current loop, Half Duplex ON c) Faulty Keyboard d) Faulty Logic board	a) Replace Keyboard cable b) Turn switch OFF c) Replace keyboard d) Replace Logic board
No video and constant alarm	Bad Video/Power Supply board	Replace Video/Power Supply board

Figure 5-1 Logic Card Troubleshooting Chart

5.3 Video/Power Supply

5.3.1 Video Section

The specific approach will depend upon the actual problem. If the Video/Power Supply board is supplying high voltage to the CRT and the vertical and horizontal drive signals are present, a raster should be visible. By selecting the reverse video position (dark characters on a light background) on switch S2-1, the video section may be checked. (See Figure 5-2). The following chart is intended to guide the service technician to the problem section.

Symptom	Probable Cause	Check
No raster	A. No high voltage (check with high voltage Probe)	1. Horizontal drive 2. Q6 collector 3. Supply voltages
	B. Bad Flyback	Replace Flyback
No Horizontal Deflection	A. Horizontal Deflection circuit inoperative	1. Horizontal Drive 2. Q6 Collector 3. C24 open
	B. Bad Horizontal Deflection coil	Replace yoke
No Vertical Deflection	A. Vertical Deflection circuit inoperative	1. Vertical Trigger 2. Q2 not oscillating Q2, Q3, Q4 3. Replace yoke
	B. Bad Vertical Deflection coil	
Raster OK No video	A. No input	1. Video input 2. Contrast Control
	B. Bad amplifier	Q1
	C. Bad CRT Cathode	Replace CRT
No focus Control	A. No boost voltages	1. CR4, CR6 2. CR16, C11
	B. Bad R7, R3	Check continuity with power disconnected
No Brightness, Poor Brightness	No -125V	CR4, C16

Figure 5-2 Video Section Troubleshooting Chart

5.3.2 Power Supply Section

The power supply may be checked by working from input to output after it has been confirmed that the problem is in the power supply section and not somewhere else. Each of the power supply regulators have thermal shutdown circuitry so that any short or overload condition will keep the outputs low. In addition, the 5V supply has a crowbar circuit (See Section 3.2.1) which will keep the 5V output at zero until the power is interrupted and the overload is corrected or removed.

Troubleshooting involves finding and correcting the overload, rechecking the voltage levels and, finally, verifying proper system operation.

5.4 Keyboard

5.4.1 Troubleshooting the Viewpoint keyboard involves simple signal tracing. After isolating a system problem to the keyboard, check incoming power supply voltages and the input polling pulse. Make sure that the chassis ground is connected to prevent noise problems on the logic line. Refer to the theory of operation for specific test points and/or signals. See Figure 5-3 for key matrix numbers.

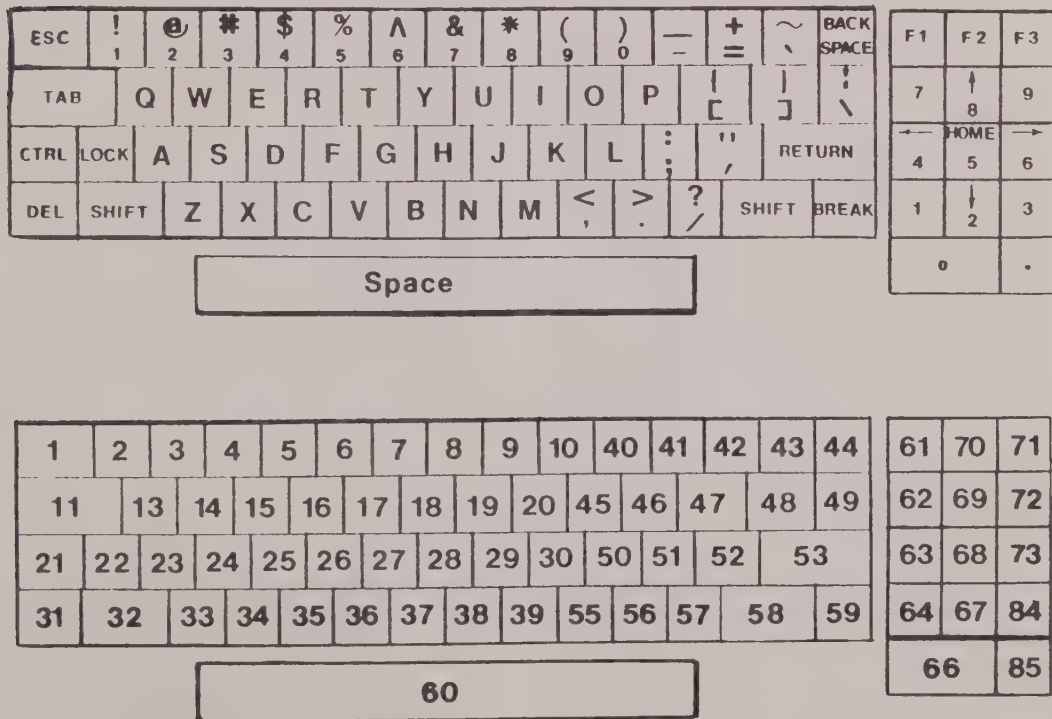


Figure 5-3 Key Matrix Numbers

SECTION 6: MAINTENANCE

6.1 General

The Viewpoint system requires very little periodic maintenance. The cabinet may be cleaned with a damp cloth and mild detergent. Care must be used to prevent any moisture from entering the ventilation slots. Dry thoroughly with a soft cloth.

6.2 Hand Test Procedure

The following procedure is provided so that the Viewpoint may be tested to determine if it is operating correctly. Perform the following tests whenever any maintenance has been performed or when proper system operation needs to be verified.

1. Turn power on. Bell tone should be heard and, after a thirty second warm-up period, the cursor should appear in the upper left hand corner of the screen.
2. A. Press the following keys:
 Q W E R T Y U I O P
B. Press the space bar twice.
C. Press CTRL-N.
D. Press the following keys: A T T R I B U T E
E. Press CTRL-O.
F. Press the space bar twice.
G. Press ESC, Ø, A the following letters should be at half intensity: ATTRIBUTE. These letters should be at normal (full) intensity:
QWERTYUIOP

3. Continue checking the ATTRIBUTE function as follows:

Code	Attribute
ESC,Ø,B	Blinking
ESC,Ø,C	Blinking, Half Intensity
ESC,Ø,P	Reverse Video
ESC,Ø,Q	Reverse Video, Half Intensity
ESC,Ø,R	Reverse Video, Blinking
ESC,Ø,S	Reverse Video, Blinking, Half Intensity
ESC,Ø,	Underlined
ESC,Ø,a	Underlined, Half Intensity
ESC,Ø,b	Underlined, Blinking
ESC,Ø,c	Underlined, Blinking, Half Intensity
ESC,Ø,D	Suppressed Video

4. Press ESC,Y, +, G. Cursor should be positioned in the center of the screen.
5. Press CTRL-G. The Bell tone should be heard.
6. Press CTRL-U. The cursor should move back one space.
7. Press CTRL-J. The cursor should move down one space.
8. Press CTRL-F. The cursor should move forward one space.
9. Press CTRL-Z. The cursor should move up one space.
10. Press CTRL-A. The cursor should move home.*
11. Press CTRL-L. Cursor should move to the upper left corner and the screen should be erased.
12. Press ESC,5. Press any keys. No character should be displayed.
13. Press ESC,6. Press any keys. Characters should now appear.
14. Press CTRL-l
15. Hold down the CTRL key and press A, J, F, G and each letter should be displayed with an underline. CTRL-G should not sound the Bell when keyed.

* Home will be the lower left corner with Auto Scroll enabled and the upper left corner with Auto Scroll disabled. (See Figure 1-5)

16. Press CTRL-2. Repeat step 15. When CTRL-A is keyed, the cursor will move HOME. When CTRL-J is keyed, the cursor will move down one line. When CTRL-F is keyed, the cursor will move foward one space. When CTRL-G is keyed, the bell will sound. Each control function should be performed and not displayed. (eg.: CTRL-G should produce the Bell tone.)

	10	20	30	40	50	60	70	80	90
1	SP " # \$ % & ' () * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _ ` a b c d e f g h i j k l m n o								
2									
3									
4									
5									
6									
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8									
9									
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23									
24									

Absolute Cursor Addressing Chart

The Cursor can be moved to any screen position by pressing ESC, Y and then the appropriate row and column keys.

EXAMPLES:

ESC, Y, 0, P

ESC, Y, 1, a



APPENDIX B

ASCII CODE CHART

BITS					COLUMN							
ROW					0	1	2	3	4	5	6	7
b ₇	b ₆	b ₅	b ₄	b ₃	0	0	0	0	1	1	1	1
b ₂	b ₁	b ₀	b ₇	b ₆	0	1	0	1	0	1	0	1
0	0	0	0	0	NUL	DLE	SP	Ø	Q	P	ˆ	p
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	o	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	\$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	A	LF	SUB	*	:	J	Z	j	z
1	0	1	1	B	VT	ESC	+	;	K	[	k	{
1	1	0	0	C	FF	FS	,	<	L	\	l	
1	1	0	1	D	CR	GS	-	=	M	]	m	}
1	1	1	0	E	SO	RS	.	>	N	^	n	~
1	1	1	1	F	SI	US	/	?	O	_	o	DEL

VIEWPOINT REPAIR POLICY

Applied Digital Data Systems Inc. products are fully warranted (parts and labor) for a period of 90 days after shipment, provided repairs are performed at an Applied Digital Data Systems Inc. depot or factory repair center.

Applied Digital Data Systems Inc. products have been designed for maximum maintenance accessibility of major sub-assemblies. The user may elect to troubleshoot an equipment failure on his own and return a malfunctioning sub-assembly to the nearest Applied Digital Data Systems Inc. factory repair center for repair. The cost of repair on the Keyboard, Power Supply/Video Card and Main Logic Card is \$65 each.

At the user option, a defective terminal may be returned to Applied Digital Data Systems Inc. for repair. Applied Digital Data Systems Inc. will repair any failure that occurred through normal use for a fee of \$80.00.

Please note that prior to returning any defective material for repair, the nearest Applied Digital Data Systems Inc. Repair Center (see below) should be contacted for a "Service Repair Authorization (SRA) Number". This number will be required to appear on all address labels and packing slips, for equipment being returned.

ADDS REPAIR CENTERS

Hauppauge, New York	516-231-5400 Ext. 373	
Atlanta, Georgia	404-455-9341	
Schaumburg, Illinois	312-843-7560	
Dallas, Texas	214-387-2337	214-829 4214
Tustin, California	714-730-6444	
Palo Alto, California	415-856-0560	
Kent, Washington	206-872-5161	

For those customers wishing to maintain an inventory of replacement parts, to accomplish their own repairs, a list of sub-assembly prices is provided for convenience. These items may be purchased directly from Applied Digital Data Systems Inc. as noted below.

Recommended Spares

<u>Part Number</u>	<u>Description</u>	<u>Price</u>	<u>1-25</u>	<u>26-50</u>	<u>51-75</u>	<u>76-100</u>
129-24900	Logic PCB	\$260.00	1	2	4	5
129-29500	Logic PCB	\$260.00	1	2	4	5
518-00700	PS/Video Assy	\$234.00	1	2	4	5
355-10500	Keyboard	\$190.00	1	2	4	5
350-03800	Transformer	\$50.00			1	1
518-20500	K/B Cable	\$4.50	1	1	1	2
345-10200	Yoke Assy	\$21.00		1	1	2
345-10300	CRT Assy	\$70.00		1	1	2

PER ORDER DISCOUNT RATE

<u>Dollars</u>	<u>Discount</u>
\$1000-\$4999	10%
\$5000-\$9999	20%
\$10,000 & UP	30%

ORDERING INFORMATION

All orders for spare parts must be sent to:

Applied Digital Data Systems Inc.
100 Marcus Blvd.
Hauppauge, NY 11788
ATTN: Order Entry

Include the following information on your purchase order.

Bill-to address
Ship-to address
Purchase order number
Method of shipment (UPS, Air Freight, etc.)
Part Number and quantity of items ordered
Price and required delivery

If priority handling is required, please note this on your order and include a phone number and contact at your company.

MINIMUM ORDER VALUE - \$50.00 PER ORDER.
PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE.
ALL ORDERS ARE SHIPPED F.O.B. HAUPPAUGE, NY

WARRANTY-COMMUNICATIONS AND TERMINAL PRODUCTS

The seller warrants each new communications and terminal product manufactured by it, to be free from defects in material and workmanship under normal use and service for a period of 90 days from the date of shipment. Seller's sole obligation under this warranty is limited to making good, at its factory, any product or any part or parts thereof found to be defective, provided the buyer bears the cost of shipping charges in connection with the repair or replacement of the defective equipment. SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED: AND ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEEDS THE FOREGOING WARRANTY IS HEREBY DISCLAIMED BY SELLER AND EXCLUDED FROM ANY AGREEMENT MADE BY ACCEPTANCE OF ANY ORDER PURSUANT TO THIS QUOTATION. Seller will not be liable for any consequential damages, loss or expense arising in connection with the use of or the inability to use its products or goods for any purpose whatever. Seller's maximum liability shall not in any case exceed the contract price for the products.

EXTENDED WARRANTY

Applied Digital Data Systems (ADDS) offers an extended warranty contract exclusively for the Viewpoint and the Viewpoint/3A Plus. ADDS warrants each new communications and terminal product manufactured by it to be free of defects in materials and workmanship under normal use and service for a period of 90 days. This contract, when signed by the purchaser and submitted to ADDS with payment and a document (sales receipt, invoice, etc.) that establishes date of purchase will extend the standard warranty coverage to a full two or three years depending on the option selected.

ADDS' sole obligation under this warranty is limited to repairing, at its factory, any failure of the equipment for the period selected, provided that the buyer bears the responsibility for payment of all shipping and insurance charges connected with the repair.

APPENDIX D:

List of Recommended Tools

The following tools are recommended to perform routine troubleshooting activities.

Screw driver - #2 Phillips head 12" shaft

Needle nose pliers - 6"

Open end wrench - (9/16", 3/16")

Hex Key (Allen key, .050" - 3/64")

20,000 Ohms/Volt VOM Multimeter

30-watt Soldering iron

Desoldering tool or "Solder Wick"

Xacto knife

Diagonal cutting pliers - 4 1/2"

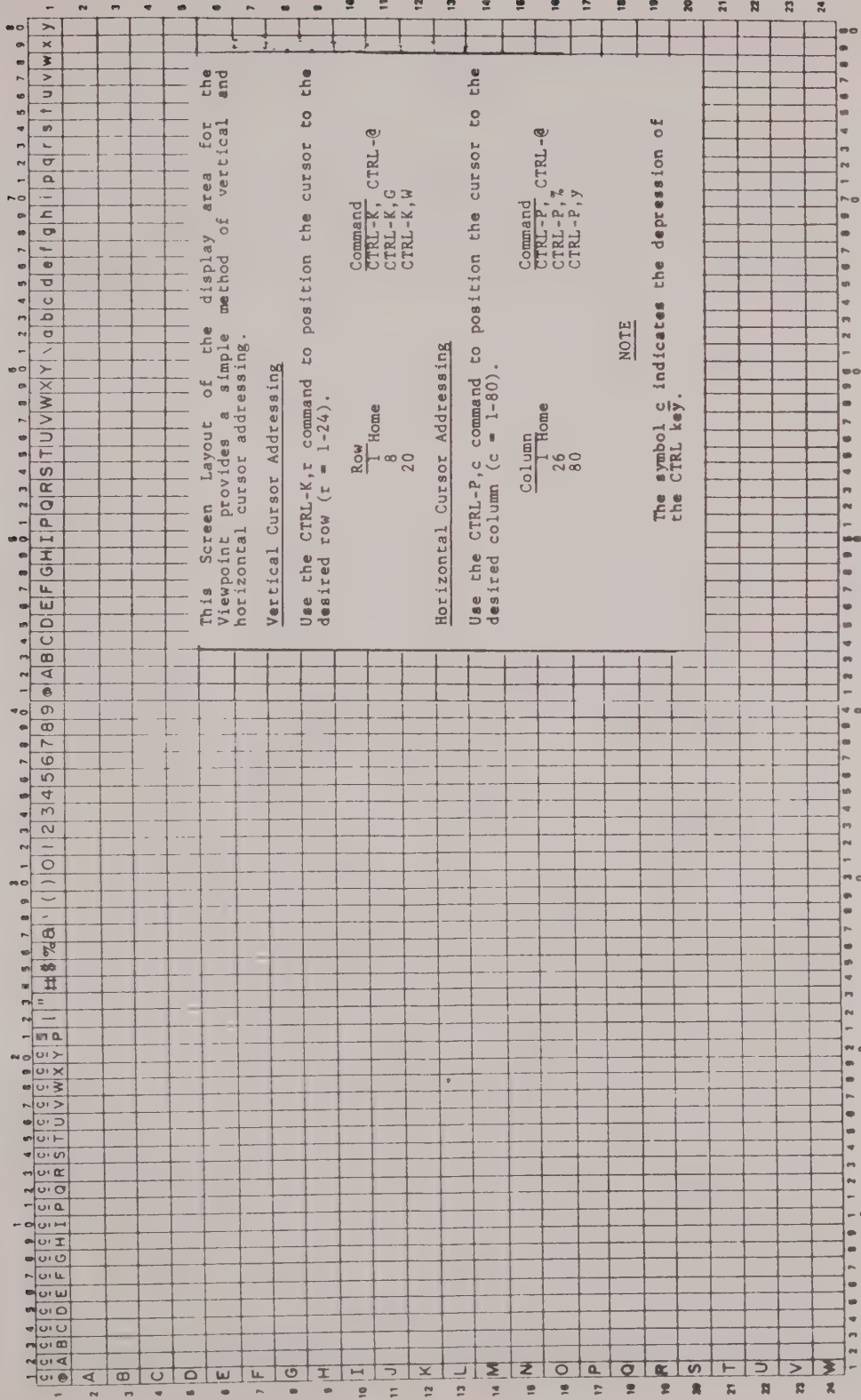
Wire strippers

10 MHz Frequency counter

Oscilloscope - with a minimum of 20 MHz response.

EIA and Current Loop Test Cables

APPENDIX E



Vertical and Horizontal Cursor Addressing Chart

APPENDIX F:

Foreign Keyboard Layouts For 129-249 and 129-289

This Appendix shows several foreign keyboard layouts. Key caps requiring replacement are circled. To replace a key cap, gently pry each side of the key cap with a small screwdriver or letter opener being careful to apply pressure equally. Grasp the cap between the thumb and index finger and lift directly upward. Replace it with the desired keycap.

NOTE: Refer to the section on switch settings to select the proper language switch settings.

1	2	3	4	5	6	7	8	9	10	40	41	42	43	44
11	12	13	14	15	16	17	18	19	20	45	46	Ä	;	“
21	22	23	24	25	26	27	28	29	30	50	Ø	Æ	52	53
31	32	33	34	35	36	37	38	39	55	56	57	58	59	

DENMARK/NORWAY

61	70	71
62	69	72
63	68	73
64	67	84
65	66	85

1	2	3	£	5	6	7	8	9	10	40	41	42	43	44
11	12	13	3	15	16	17	18	19	20	45	46	47	48	49
21	22	23	24	25	26	27	28	29	30	50	51	52	53	54
31	32	33	34	35	36	37	38	39	55	56	57	58	59	

UK/SELETRIC

61	70	71
62	69	72
63	68	73
64	67	84
65	66	85

1	2	3	4	5	6	7	8	9	10	40	41	42	43	44
11	12	13	14	15	16	17	18	19	20	45	46	47	48	49
21	22	23	24	25	26	27	28	29	30	50	51	52	53	54
31	32	33	34	35	36	37	38	39	55	56	57	58	59	

SWEDEN / FINLAND

61	70	71
62	69	72
63	68	73
64	67	84
65	66	85

1	2	3	4	5	6	7	8	9	10	40	41	42	43	44
11	12	13	14	15	16	17	18	19	20	45	46	47	48	49
21	22	23	24	25	26	27	28	29	30	50	51	52	53	54
31	32	33	34	35	36	37	38	39	55	56	57	58	59	

WEST GERMANY / SWITZERLAND

61	70	71
62	69	72
63	68	73
64	67	84
65	66	85

1	2	3	4	5	6	7	8	9	10	40	41	42	43	44
11	12	13	14	15	16	17	18	19	20	45	46	47	48	49
21	22	23	24	25	26	27	28	29	30	50	51	52	53	54
31	32	33	34	35	36	37	38	39	55	56	57	58	59	

FRANCE

61	70	71
62	69	72
63	68	73
64	67	84
65	66	85

1	2	3	4	5	6	7	8	9	10	40	41	42	43	44
11	12	13	14	15	16	17	18	19	20	45	46	47	48	49
21	22	23	24	25	26	27	28	29	30	50	51	52	53	54
31	32	33	34	35	36	37	38	39	55	56	57	58	59	

SPAIN

61	70	71
62	69	72
63	68	73
64	67	84
65	66	85

APPENDIX F:

Foreign Keyboard Layouts For 129-295

This Appendix shows several foreign keyboard layouts. Key caps requiring replacement are circled. To replace a key cap, gently pry each side of the key cap with a small screwdriver or letter opener being careful to apply pressure equally. Grasp the cap between the thumb and index finger and lift directly upward. Replace it with the desired keycap.

NOTE: Refer to the section on switch settings to select the proper language switch settings.

1	2	3	£ 3	4	5	6	7	8	9	10	40	41	42	43	44
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31	32	33	34	35	36	37	38	39	55	56	57	58	59		

UK / SELECTRIC

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62	69	72
63	68	73
64	67	84
65	66	85

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31	32	W	33	34	35	36	37	38	U ü	39	55	56	57	58	59

BELGIUM / FRANCE / AZERTY

61	70	71
62	69	72
63	68	73
64	67	84
65	66	85

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31	32	Y	33	34	35	36	37	38	39	55	56	57	58	59	

WEST GERMANY / SWITZERLAND

61	70	71
62	69	72
63	68	73
64	67	84
65	66	85

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Signature _____

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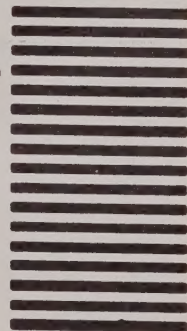
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